THE

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GOVERNMENT INTERFERENCE.

IT was once written by a surly critic of modern literature: "When a new book comes out, I read an old one!" Might not the same principle be adopted in relation to other matters, even to matters of greater importance than modern literature? The industrial world has been much troubled of late years by Government interference. New principles of political economy appear to have been evolved. When a new principle of political economy is devised, consider it in the light of an old one! It is by no means uninstructive to consider those new principles in the light of the precepts laid down by one of our leading economists in the middle of the last century. We refer, of course, to John Stuart Mill. He devotes a whole chapter of his "Principles of Political Economy" (bk. 5, chap. XI) to the "Limits of the Province of Government." Here one may discover precepts which, having regard to existing events, appear to be enshrouded with the magic of prophecy. "The intervention of Government," wrote the Great Philosopher, "may extend to controlling the free agency of individuals . . . but there are large departments of human life from which it must be unreservedly and imperiously excluded. Whatever theory we adopt regarding the foundation of the social union, and under whatever political institutions we live, there is a circle round every individual human being which no Government, be it that of one, of a few, or of the many, ought to be permitted to overstep; there is a part of the life of every person who has come to years of discretion within which the individuality of that person ought to reign uncontrolled either by any other individual or the public collectively."

Since the days of Mill, the magic circle which he described with the compass of a master draughtsman has been all too frequently encroached upon. We have, during the last 60 years, seen Government encroachment in many and various forms. The *vis a tergo* animating the movement has been described as "liberty"; but if this be true liberty, it would be small wonder if many people were to prefer to remain in chains.

Wholly apart from measures passed for the suppression of crime and for the maintenance and benefit of the public health, we have been subjected during the period mentioned to a series of measures all of which most seriously interfere with the liberty of the subject. When the history of the last 50 years comes to be written, it will probably be described as "the age of the development of taxation of and Government interference with employment in all its forms."

The Factory Acts, for which, of course, there is much to be said on the ground that they benefit the public health, have now become so interwoven with the life of the community that they have ceased to call for much comment. Nevertheless, the owner of a factory, his managers and foremen are continually made aware of the existence of such a person as the Factory Inspector. The provision of additional sanitary arrangements, additional air-space and the fencing of machinery may all be very good things and beneficial, but they involve interference with liberty, expenditure of money, and increased cost of production. A more forcible example of Government interference is afforded

by the Workmen's Compensation Acts. The principle of universal compensation has been gradually evolved since the early eighties, and the statutory protection of workmen has been so sedulously developed that the old common law liability of master to servants for accidents happening during the employment has almost ceased to be discussed in the Courts. Nor is it possible to contract out of the obligation to pay compensation. No agreement to dispense with compensation is binding on the employé. The beneficial results of this legislature may be real; but so far as the worker is concerned they are certainly not very apparent. No doubt the disabled worker has something to be thankful for; but there are thousands of older workmen who are kept out of employment through inherent liability to suffer grievously from an accident. As for the employer, he seeks refuge in insurance. The burden is transferred from his to other shoulders, and the result is the loosening of the friendly tie which formerly connected the master and the servant.

Many other examples of restriction upon employment might be culled from the Statute book. The miner may not work for more than eight hours a day. The shopkeeper may not keep open on one afternoon a week—even if he keep no assistant; and last, but not least, it is provided by the Insurance Act that practically every contract of service in the kingdom is to be modified by the compulsory payment of insurance premiums.

Enough has been said to show that the Legislature has by direct statutory enactment seriously interfered with the freedom of contract. The indictment, however, does not end with the enumeration of certain Acts of State, in relation to matters which, according to the canons of political economy already alluded to, might properly be left to private enterprise. What are the legitimate functions of Governments? Is it certain that at the present day, the Government leaves nothing undone which should be done? We have recently seen that with a view to aiding and abetting the forces of trade unionism, the Government is unwilling to exert its legitimate powers for the protection of the man who is willing to work. "Free Labour" has become a thing of the past.

It is passing strange that these things should be, under the rule of a Government alleged to be the most democratic that the world has ever seen. But Mill was far-seeing enough to prophesy that your democrat can, if occasion suit him, also be an autocrat! "Experience," wrote the philosopher, "proves that the depositaries of power who are mere delegates of the people, that is of a majority, are quite as ready (when they think they can count on popular support) as any organs of oligarchy to assume arbitrary power, and to encroach unduly on the liberty of private life. . . and the present civilisation tends so strongly to make the power of persons acting in masses the only substantial power in society, that there never was more necessity for surrounding individual independence of thought, speech and conduct, with the most powerful defences, in order to maintain the originality of mind and individuality of character, which are the only source of any real progress and of most of the qualities which make the human race much superior to any herd of animals."

Of course, no one will be heard to dispute that there are certain interferences with complete liberty which every Government may properly impose.

In the matter of education the intervention of the Government is justifiable, because the case is not one in which the interest and judgment of the consumer are a sufficient security for the goodness of the commodity. But a good Government should give all its aid in such a shape as to encourage and nurture any rudiments it may find of a spirit of individual exertion. It were scarcely necessary to insist upon that part of the functions of Government which all admit to be indispensable, namely, the function of prohibiting and punishing such conduct on the part of individuals in the exercise of their freedom as is clearly injurious to other persons, whether the case be one of force, fraud, or negligence. It is the illegitimate interference with individual effort, which one looks upon with dismay and apprehension. Let us, in conclusion, quote Mill once more:—

"To be prevented from doing what one is inclined to or from acting according to one's own judgment of what is desirable is not only always irksome, but always tends, *pro tanto*, to starve the development of some portion of the bodily or mental faculties, either sensitive or active, and unless the conscience of the individual goes freely with the legal restraint, it partakes either in a great or in a small degree of the degradation of slavery. Scarcely any degree of utility, short of absolute necessity, will justify a prohibitory regulation, unless it can also be made to recommend itself to the general conscience; unless persons of ordinary good intentions either believe already, or can be induced to believe, that the thing is one which they ought not to wish to do."

The Frame Thomson Lecture.

The Frame Thomson lecture on the principles and practice of accountancy in relation to engineering design and work was this year delivered at the Institution of Civil Engineers, by Mr. Frame Thomson, the founder of the lectureship. Terse expressions, in terminology probably more familiar to engineers than to accountants, formed a notable feature of the lecture, which, though only dealing in the main with first principles of common practice, bore the impress of careful and exact study and preparation, and should appeal to all engineers whose knowledge of the construction of accounts has perforce suffered neglect by reason of the exigencies and superior demands of their profession. After sketching in outline the financial history of a successful enterprise, the lecturer introduced the subject of accountancy, indicating as the different processes composing it—constructive or creative, productive or operative—destructive and reconstructive or reproductive.

The subject was succinctly treated from a basic point of view, and the lecturer is to be congratulated on his able exposition of the subject. Sir William Plender and Mr. L. W. Hawkins, professional accountants, contributed a few observations of elementary importance to the discussion.

Mr. Thomson hopes to be able to give next year a lecture on similar broad lines dealing with legal knowledge. Thereafter it is proposed that the annual lecture should be delivered by a lawyer or an accountant, treating of some of the special features of their respective professions with which engineers should be familiar.

If we may say so, it would emphasise the broad lines if some of the prominent or able members of the other several societies of accountants were invited to contribute some phases of their experience of, and impressions on, engineering accounts and costs, &c.

Spontaneous Combustion of Coal.

A memorandum by the chief engineer surveyor of Lloyd's upon the spontaneous ignition of bunker coal will be interesting to engineers of large power stations whose bunkers have features similar to those of a ship, viz., exposure to high temperatures, as where placed above boilers. Coal has long been supposed to owe its danger of spontaneous ignition to pyrites, but this has now been disproved. In 1911, of 127 reported cases of ships with coal on fire, only 24 were fires of the coal cargo, and 103 were bunker fires. Cross bunkers appear more liable to fire than side bunkers.

The investigation for the foregoing cases did not apparently afford much material for a report, and so the present memorandum is based on past knowledge, and the reports of special commissioners, starting from that of 1875, which is now regarded as more wrong than right in its conclusions; though Dr. Percy and Prof. Abel were correct on the point of oxygen absorption, they were wrong in their suspicions as to pyrites. Since pyrites oxidises more quickly when damp, it was thought that damp coal was more likely to fire than dry coal, and therefore that damping coal should not be practised, forgetting that the water would act as a heat-absorbing agent and also by evaporating would displace oxygen and thus deprive the fire of food. A few years later

than the above date one Henri Fayol, of Commentry, France, gave details of observations and experiments on coal of eighteen varieties. He showed that between 25° and 400° C. under the action of air all the coals first lost weight, after which they more than fully recovered the loss. The recovery was due to the absorption of oxygen. After a certain period diminution of weight set in again. This, of course, was due to slow combustion of the coal by the absorbed oxygen. Coal was found to absorb as much as 100 times its own volume of oxygen. In the course of the experiments, heaps of coal of about 3 cb. yards capacity were piled up in conical form, heated to 100° C. and covered with a bell, through which, at the top and bottom, were holes for the passage of air. When the holes were closed the temperature fell. If some holes were left open the temperature rose steadily until ignition took place. When the bell was removed the mass cooled down. Air was shown to be essential in a certain quantity, but the quantity must be limited, for given plenty of air, this carried away more heat than was produced. Fayol found that moisture was more of a safeguard than a danger, nor could he trace any special effect to pyrites.

He laid stress only on air absorption, and as air or oxygen absorption is a surface action, small coal is necessarily far more dangerous than large coal. Thus, the conditions for safety are large coal and complete absence of air, or else a very good flow of air. The latter cannot so well be secured with small coal, for it packs closely, and hence small coal offers a double danger, for it has bigger surfaces of absorption and affords less passages for the free flow of air. The lesson is that small coal should be enclosed in air-tight bunkers—a matter of no little difficulty. Towards this point, however, bunker doors should be kept closed below when not in use. Since heat assists oxygen absorption, that coal which is nearest the boilers should be used first, so as to get it out of danger. Fayol advises the damping of small coal when bunkered. It may be recollected that some years ago a favourable report appeared in certain technical journals upon the good effect of burying bottles of liquid CO_2 in masses of coal. By some means, possibly fusible metal plugs, when the coal heated, the CO_2 was allowed to discharge into the mass of coal, and this appeared to stay further mischief and there was no recurrence of heating.

It would appear to be a good plan to lay a perforated water-pipe through the mass of coal in a bunker; the pipe could be used for the insertion of a tell-tale thermometer or for water injection. Coal in a fine state of division is very absorptive of oxygen, and is reduced to CO_2 by slow combustion. Some years ago at the hotel at Cranbrook, in Sussex, a well 200 ft. deep and about 4 ft. in diameter was put down in the Ashdown Sand formation. As is well known, this sandstone is highly carboniferous and carries many fine veins of coal, some of them as much as $\frac{1}{16}$ in. thick. While the barometer was rising, men could enter the well and work at the bottom of it, but when the barometer fell, the air imprisoned in the porous sandy rock expanded and flowed out of the well. The mouth of the well was half inside the pantry of the house and half in the open air. The doorway was over the well mouth, and the door was absent.

Yet with all this ventilation a candle on a shelf in the pantry, 3 ft. high, was extinguished by the "air" flowing out of the well, and it was quite impossible to introduce a lighted candle below the cover boards of the well. Every change in the barometer produces alternate inflow and outflow of air at every well which enters porous strata, and the thin coal seams were thus exposed to constantly renewed supplies of oxygen, with the result that much CO_2 was formed.

Fayol, though finding great differences in the ease with which different coals will ignite spontaneously, says that all coal, not excepting even anthracite, is liable to spontaneous ignition.

It is really so simple to place trial tubes in every bunker, and take thermometer readings, that it should be possible to prevent the temperature reaching such a point as to be dangerous. One safeguard would be to avoid extreme length of bunker; water-space division bulkheads might be used to separate them into moderate lengths, so that any specially heating division could, if necessary, be damped or completely drowned.

ROTHERHAM ELECTRIC LIGHT, POWER AND TRAMWAYS UNDERTAKING.

BUILT to the designs of Prof. Kennedy in 1900, the Rotherham Corporation electricity works bids fair to become a purely turbine-driven station in the near future, and as good an example of modern concentration of power within small compass as it has been in the past of the use of small engine-driven sets and the generous allocation of floor space.

The original equipment comprised two 90-KW. Allen sets and two 2 × 13-KW. steam balancers, and subsequently there were installed two 165-KW. Allen sets and one each 320-KW. Allen-Allen and Allen-Siemens sets (see figs. 2 and 3, pp. 124-5). Where the steam balancers once stood, there is now working a 500-KW. Westinghouse turbo-dynamo with radial commutator and Morganite brushes. During the past 18 months this generator has averaged 19 hours' running per day; it is only at week-ends that the commutator can be thoroughly cleaned, yet no sparking or other troubles are experienced. In place of the steam balancers, a 70-KW. Siemens motor balancer is now employed. The 256-cell 250-amp.-hour battery merely "floats" on the lighting bus-bars.

The 500-KW. turbo set being fully loaded soon after its installation (in 1909), it became necessary to provide further generator capacity. The existing equipment completely filled the effective floor space in the engine room (110 ft. × 40 ft. overall), and building extensions being prevented by the destructor and by the gas works, at the respective ends of the power house, increased capacity could only be secured by replacing the older plant by turbo-sets. Following this plan, a 950-H.P. engine-driven surface condenser plant has just been replaced by a 1,000-KW. horizontal Westinghouse turbo-alternator (three-phase 3,300-volt, 50 cycles, 3,000 R.P.M.) and its auxiliaries, and a duplicate steam-driven condenser set will be similarly replaced in the immediate future.

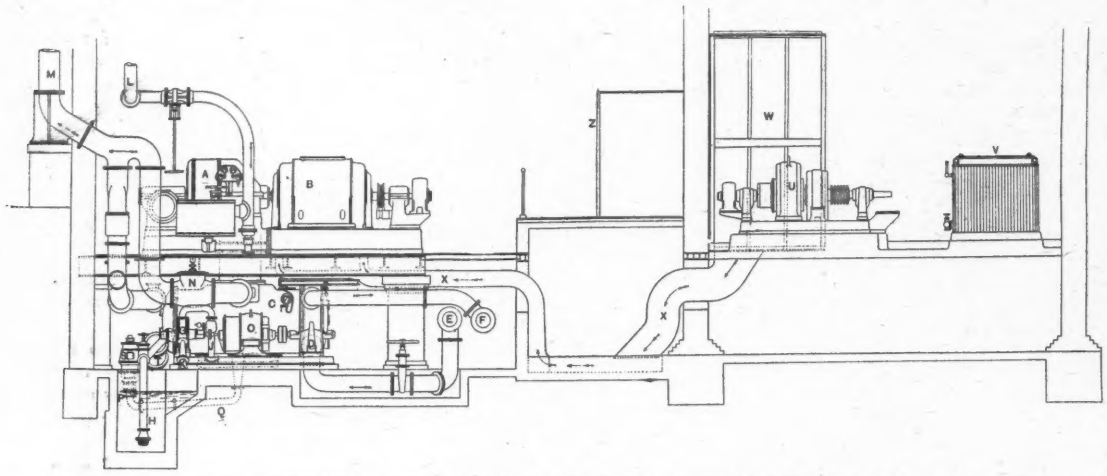
The lay-out of the present extension unit (see figs. 1-3) provides for the future installation of a similar machine on the adjacent bed, with a minimum of derangement or alteration to existing pipework, &c. The most striking feature of its general design is the small floor space occupied (5 ft. 6 in. × 17 ft. 6 in. overall), this being secured by employing a high-pressure impulse turbine. A velocity wheel in the initial stage is followed by seven Rateau stages—an arrangement which secures efficient utilisation of the high-pressure steam (140 lb. per sq. in. at the stop valve), while reducing the pressure to which the turbine casing is exposed to about 40 lb. per sq. in. Fig. 1 clearly shows the arrangement of the main and auxiliary parts of the set, which is further shown in course of erection in figs. 2 and 3.

At a power factor of 0·8 the alternator has a continuous full-load output of 1,000 KW. and an overload capacity of 25 per cent. for two hours and of 50 per cent. momentarily, without special adjustment, or for 10 minutes with the aid of a by-pass supply. The turbine is at present supplied with steam at 140 lb. per sq. in. and 100° F. superheat, but it is so designed and built that the inlet temperature of the steam may safely be raised to 560° F., if desired; a 28-in. vacuum is maintained when the barometer stands at 30 in.

The surface condenser and circulating pump were supplied by Messrs. Allen, and the air and extractor pumps by the Westinghouse Co.; for the arrangement of these auxiliaries and their driving motors, see fig. 1. The Leblanc air pump has been adopted on account of its great simplicity and high volumetric efficiency, which is, moreover, practically constant at all vacua. Approximately one volume of water is required per 6 to 10 volumes of air.

The alternator is of the latest Westinghouse standard design. The slot-wound field structure is shrunk on to the shaft, and designed with a view to its permanent rigidity and balance in service and thorough ventilation in all parts. The armature winding is contained in wedge-closed slots, and is provided with special bracing of the end coils to guard against displacement of the latter by the mechanical forces set up under short-circuit conditions. Ventilation is effected by means of fans mounted on the generator shaft;

cool air is drawn through a "Buffalo" filter in the rotary room (fig. 1), and a system of ducts XX (fig. 1), and is expelled from the top of the alternator housing. An "overhung" exciter with radial commutator allows of complete alternator regulation by means of the exciter field rheostat in conjunction with a Brown-Boveri automatic regulator.



A, turbine; B, alternator; C, condenser; D, circulating pump (E suction, F discharge); G, air pump (H seal water suction, J air suction, K discharge); L, main steam pipe; M, atmo. exhaust; N, automatic valve; O, motor; P, extraction pump (Q suction, R discharge); S, motor; T, oil cooler; U, rotary converter; V, transformer; W, air filter; X, air duct; Z, switchboard.

FIG. 1.—ARRANGEMENT OF NEW PLANT IN ROTHERHAM ELECTRICITY WORKS.

The guaranteed overall efficiency of the generating set, and the actual performance realised during the recent official tests at the maker's works, were as follows (see also fig. 4). Conditions:—Stop-valve pressure 140 lb. per sq. in. gauge; superheat 100° F.; vacuum, 28 in.; barometer, 30 in.

Load.	Lb. steam per KW.-hour at 0·8 p.f. Guaranteed.	Test.
1¼	17·0	15·8
Full	17·0	16·1
¾	18·2	(17·2)
½	20·8	19·3
¼	28·5	(23·5)

(Bracketed figures interpolated.)

The whole of the extension plant and its erection was executed to the specification and under the supervision of Mr. E. Cross, engineer and manager of the undertaking. The specification issued to tendering firms wisely left a number of details of manufacture and design to be specified by these firms, with a reservation that such recommendations would not be accepted if inconsistent with the general requirements of the department, thus at once securing the interests of the latter while taking full advantage of the special experience of makers.

In addition to the duplicate turbo-alternator which must soon be required, a 500-KW. rotary converter is now on order.

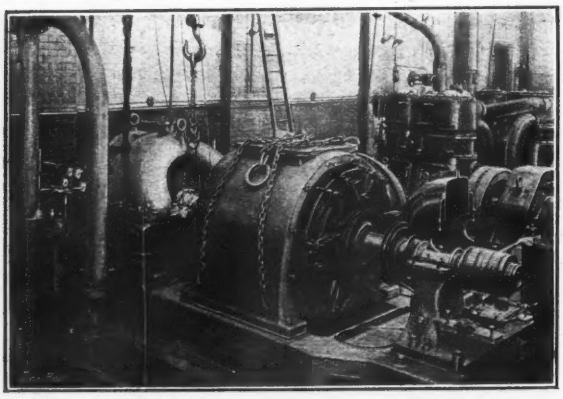


FIG. 2.—WESTINGHOUSE TURBO-ALTERNATOR IN COURSE OF ERECTION.

Further converters will be installed as required in a room adjoining the power house. As still greater generator capacity becomes necessary, the reciprocating engines will be successively replaced by turbo-alternators, supplying converters in the main and sub-stations; when the engine room is full of turbo sets a fresh site will be secured, with ample room for extensions, and the station will be entirely rebuilt.

The seven Lancashire boilers already installed (totalling 35,000 lb. per hour evaporative capacity) have never yet been worked to their full capacity, and, in view of the great steam economy effected by the turbine plant (19·5 lb. per KW.-hour on the 500-KW. turbo set and 16·0 lb. on the 1,000-KW. unit, as against 30 lb. per KW.-hour on the largest reciprocating engines, condensing in every case), it is improbable that boiler extensions will be needed for some time to come.

A two-unit (three cells each) Heenan-Froude refuse destructor, heating two Babcock & Wilcox boilers, is worked by the sanitary department in a building immediately adjoining the electricity works. The refuse handled is rich in cinders, and is delivered over a weigh-bridge, being paid for at 1s. per ton by the electricity department. The steam raised is not metered, but from 60 to 70 tons of refuse (of average evaporative value 2·075 lb. per lb., from and at 212° F. with feed at 175° F.) are destroyed per day. Clinkers from the destructor are ground down by two 40-H.P. electrically-driven mills, and conveyed by barge to the sewage filter beds.

Town water at 10d. per 1,000 gallons is used for feed purposes, the canal water being so corrosive that the surface condensers need "tubing" once weekly. For the privilege of drawing this fluid through a 12-in. pipe, the department pays £150 per annum, though the whole of the circulating water is, of course, returned!

The surface condensers on the turbo-sets are highly efficient, but the remaining 950-H.P. steam-driven condenser serving the Allen engines gives negligible vacuum when the latter are on full load, owing partly to leakage in the exhaust line, but mainly to corrosion of the circulating tubes; nevertheless, the condenser is useful in restricting the consumption of town feed water.

The supply area covered by the Corporation's order is of straggling shape and totals about 9·4 sq. miles, of which two-thirds is open country; of the more densely populated area, two-thirds is provided with mains, and special supply is given to the Home Office testing station at Greasborough and to two works in Tinsley. The station is situated 600 yards north of the centre of the town, and the most remote consumer is at a distance of 3·25 miles; 24 miles of lighting and power cables and 10 miles of traction feeders are now laid.

Hitherto it has been impracticable to supply large power loads at remote parts of the supply area (the maximum station voltage being 520 volts D.C.). Similarly, it has been unprofitable to lay special cables for small consumers, so that the development of the undertaking, as regards industrial supply, has been considerably hampered. Matters came to a crisis with the demand for 500-600 H.P. by a large tube works at Wincobank, near Tinsley. To avoid the necessity of transferring the area concerned to the Sheffield Electricity

Department, and in order to demonstrate the economy to be derived from the use of electric power, the Rotherham Corporation removed one of its 250-H.P. Allen sets to the new consumer's works, where it has been running satisfactorily for 18 months past, steam being supplied from a special boiler, and the electricity department paying the coal and stokers' bill and charging about 0·76d. per unit for the energy delivered. Simultaneously, arrangements were made for the installation of a 1,000-KW. turbo-alternator at the Rotherham station, and henceforth high-pressure supply of the above and other bulk consumers will be a simple matter, and, in contrast to the present Wincobank plant, will yield a reasonable profit to the department. The temporary installation at Wincobank will be dismantled at an early date and replaced by a 250-KW. converter supplying such motors as are necessarily of D.C. type; three-phase motors will be employed wherever possible.

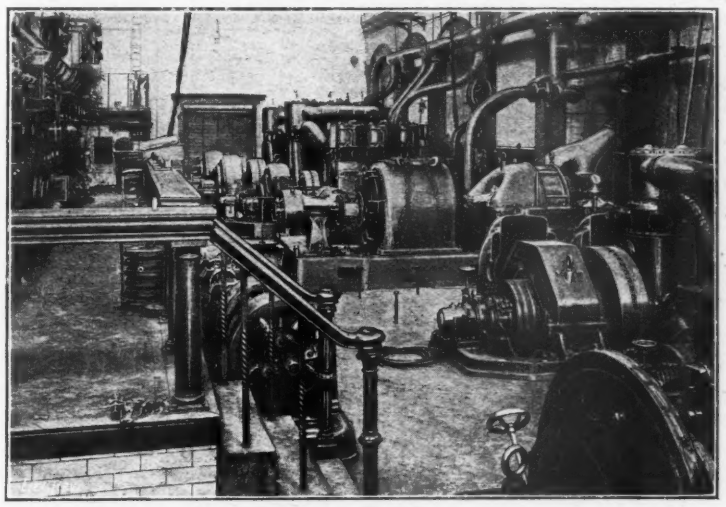


FIG. 3.—ROTHERHAM ELECTRICITY WORKS: ENGINE ROOM.

So far as can be foreseen, high-pressure supply will be entirely by underground cable. On the Wincobank route, three-core armoured Callender cables are drawn into conduit and the line is already complete except at railway bridges. Seven of the latter have to be traversed, and incredible difficulty has been encountered in securing the necessary wayleaves from the owners.

For D.C. distribution, Glover's lead-covered diatrine cables are laid solid and in Sykes conduits; Callender single V.B. cables are also employed, but the old concentric cables have been almost entirely replaced, with a great reduction in the frequency of faults.

The latest available returns show that a generator capacity of 2,650 KW. supplies 3,746 KW. connections, and a maximum demand of 745 KW. non-traction and 742 KW. traction load (1,487 KW. total). The total sales by meter during the years ending March, 1910-11-12, were as follows:—

	B.T.U. 1911-12.	B.T.U. 1910-11.	B.T.U. 1909-10.
Lighting	370,292	335,378	303,362
Power	1,118,912	991,395	465,553
Traction	1,414,449	1,342,954	1,209,097
Total ...	2,903,653	2,669,727	1,978,012

It will be seen that the total sales are rising rapidly, mainly owing to the increasing power demand. The annual load factor of the station is now 23 per cent., as against 25 per cent. in 1910-11 and 21·3 per cent. in 1909-10. Already there is a valuable over-lapping of the evening traction and non-traction loads, so that the peak demand (1,300 KW.) lasts from 4 p.m. to 8 p.m. (in winter), with crests at 4.45 and 6.30 p.m.

Although the traction demand is steadily increasing and will be considerably augmented by the opening of various railless trolley routes, it is in the power sales of the undertaking that the greatest expansion is likely to be attained. The area served is teeming with industrial works of every description, and the availability of high-pressure A.C. for distributing purposes will render their electrical supply profitable to all parties concerned.

The present routes served by the Rotherham Corporation tramways have a total length of 9·39 miles (equivalent to 13·48 miles single track). The maximum gradient is 1 in 10·5 (on the Kimberworth route), and, taken as a whole, the conditions are not severe.

Extensions which are in immediate prospect include 7 furlongs to the important colliery village of Thrybergh (7,000 population tapped); and 1 mile 1 furlong to the borough boundary along the existing Broom Road route (tapping a population of 3,170). The latter line, serving a residential area, has so far been a source of serious loss to the department, but, by the inauguration of a 4·75 miles railless-trolley route from the borough boundary to Maltby (serving about 10,000 inhabitants in the district traversed), it is hoped to realise a large net profit from the route. If the service proves remunerative, one of the most extensive railless systems in the country will immediately be inaugurated.*

The tariffs levied are 4·0d. per unit for lighting supply, less 2·5 per cent. for cash, or 10 per cent. if the consumption exceeds 10,000 B.T.U. per annum, up to 30 per cent. discount for over 40,000 units per annum. Small power consumers are supplied at 1·5d. per unit; consumers demanding not less than 5 H.P. steadily during working hours are supplied at 1·0d. per unit, less discounts varying from 5 per cent. to 40 per cent. for consumptions exceeding 10,000 or 750,000 units per annum respectively.

The average price obtained for all sales was 1·525d. per unit during 1911-12, leaving a gross surplus of 0·60d. per unit generated. The gross profit on the electricity undertaking during the same period was 10·85 per cent. (and 6·88 per cent. on the traction system). These results were the most satisfactory obtained since the commencement of supply. The net profit was 4·78 per cent. in 1911-12.

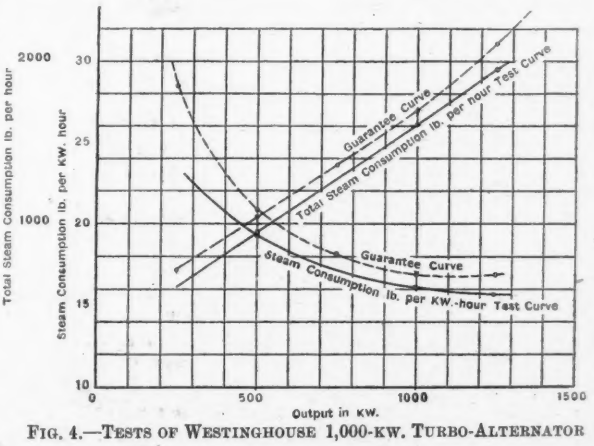


FIG. 4.—TESTS OF WESTINGHOUSE 1,000-KW. TURBO-ALTERNATOR

Our best thanks are due to Mr. Ed. Cross, engineer and manager of the Rotherham Corporation Electricity and Tramways Department, and to his chief assistant, Mr. J. Williams, for their courteous assistance in the collection of the above notes, at a time when they were busily engaged on the extensions described.

Patent Application.—Application has been made for restoration of Patent No. 24,411, of 1905, for "Improvements in and relating to the regulation of the supply of liquid fuel to internal combustion motors," granted to Georg Brandstetter.

* The Corporation has Parliamentary powers for a further total length of route 9½ miles.

CORRESPONDENCE.

Letters received by us after 5 P.M. on Tuesday cannot appear until the following week. Correspondents should forward their communications at the earliest possible moment. No letter can be published unless we have the writer's name and address in our possession.

Trouble with the Trolley Head.

Mr. Geo. Spooner's remarks are quite correct so far as systems with centre running trolleys are concerned, but where the overhead equipment is erected on bracket arms for swivel-headed trolleys, the bow collector would be of no use, and the great majority of tramways are equipped with the trolley wires in anything but a centre-running position. In the case of a centre-running trolley, the deviation from the centre line does not allow of more than about 2 ft., whereas with a side-running trolley the trolley wire need be only approximately parallel to the track and as far from the centre as the length of the trolley-arm will permit.

R. A. Pickmere.

London, E., *July 20th*, 1912.

Vacuum Cleaners.

The "Notes on Vacuum Cleaners," appearing on pages 112 and 113 of your last week's issue, have been of considerable interest to us. It seems to us that whilst your correspondent is well informed on general grounds, he loses sight of one important issue.

There are, broading speaking, two types of vacuum cleaners :—Type "A," high-vacuum machines, *i.e.*, machines operating with a small volume of air at a high vacuum; and Type "B," low vacuum large-air displacement machines, *i.e.*, machines relying upon a large volume of air in place of a high vacuum.

We think vacuum cleaner construction during the last few years, both here and abroad, proves beyond all doubt that the latter principle is the correct one. Let us look into the merits of each type :—

A. *High-Vacuum Machines.*—It may be readily claimed for this type that they effectively clean floor coverings, and that they are equally suitable for the removal of dust from cornices, walls, &c., if maintained in a high state of efficiency, and if they are used with more than ordinary intelligence, and these advantages may be claimed for both domestic and industrial use, and where employed for industrial use, they are, in our opinion, preferable to low-vacuum machines. But let us look into the disadvantages :—

1. Mechanical damage to floor coverings resulting from the cutting action of the intake nozzle, since it is necessary to maintain very close contact with the floor covering in order to obtain sufficient suction.

2. Damage to the pile of floor coverings from the excessive suction, which in the absence of a sweeping volume of air is necessary for effective cleaning (ask your carpet dealer whether the high-vacuum cleaner is not his best friend).

3. The small intake nozzle necessary to maintain a high vacuum prevents the removal of the rubbish met with on the ordinary carpet in the house, restaurant, club smoke-room, &c.

4. The absolute impossibility to construct a self-contained really portable apparatus, which leaves the operator free to work both hands.

5. The great weakness of the delicate suction mechanism, and the impossibility of obtaining even ordinary repairs from an ordinary engineer.

There are many other disadvantages, but the above will serve to show the most important of them.

Low-Vacuum Large Air Displacement Type.—The advantages of cleaners of this type as compared with the type previously dealt with are many :—

1. The simple construction, *i.e.*, absolute absence of delicate mechanism.

2. The possibility of constructing self-contained movable machines on wheels of a weight and type securing comfortable transport to every part of the house by the lady or maid.

3. Automatic compensation of the large volume of air in place of a high vacuum when the machine is not kept actually on the floor covering. (As the vacuum is reduced the volume of air is increased, and equally effective work is secured.)

4. The absolute harmlessness of continuous use, owing to the low vacuum, and owing to the fact that it is unnecessary to maintain a hard-rubbing action with the floor covering.

5. Large intake nozzles, admitting of the reception of ordinary rubbish—such as pieces of paper, cigar and cigarette ends, matches, &c.; thus the machine possesses all the advantages of the ordinary carpet sweeper.

6. The automatic ventilation of the motor which prevents an undue temperature rise, and thus assists towards long life.

7. The reduced exertion required in the use of a small self-contained machine, compared with the continued operation of the nozzle of high-vacuum machines, which must be kept in perfect contact with the floor covering.

8. The possibility of using the machine as an ordinary fan or as a blower for bedding renovating purposes, &c.

9. And this, perhaps, is the prime advantage—"The adaptability and usefulness of a small self-contained cleaner for its prime purpose, *i.e.*, *the cleaning of floor coverings.*"

The first consideration in the design of a vacuum cleaner surely lies in the question as to where it is to be used, and it will appeal to the ordinary intelligence that at least 75 per cent. (in actual practice it is probably 90 per cent. or 95 per cent.) of all the work expected from it is on the floor, and if this is admitted it is necessary to construct an apparatus which will efficiently, conveniently and thoroughly do this work.

It may be claimed for machines of the high vacuum type that they are more effective in actual use than low vacuum and large air displacement types, but if we remember that a small portable machine will be used with the same regularity as the brush or carpet sweeper in the home, we must come to the conclusion that we obtain reliable cleaning work from a suitable small and portable machine.

We claim all the advantages enumerated above for the "Magic," which, especially for domestic use, may be relied upon to do all its work, and to do it continuously and well, and when it is remembered that the complete equipment, including a set of attachments which answers every possible application, is supplied at the moderate price of £13 to the public, the average householder will require much convincing that a stationary plant, costing, as your correspondent points out, say, £30, which, however, before it is fixed, *i.e.*, before the necessary piping in a house of even average size has been provided, is more likely to cost from £120 to £150, is a more suitable appliance for him.

We are hopeful that we shall have an opportunity of demonstrating the use of the "Magic" in open competition with some of the high-priced high-vacuum machines at some future date.

The popular fallacy that a high vacuum is necessary in order to efficiently remove dust and other impurities is rapidly going to pieces.

For **Magic Appliances, Ltd.,**
J. Schmahl, *Managing Director.*

London, E.C., *July 23rd*, 1912.

Electricity in the Restaurant.—Mr. Hilary Quertier, of Wellington, has invented an electric waiter for hotels and restaurants, which is worked by the customer in direct communication with the kitchen. On each table is a wooden frame bearing the menu card, and opposite each item of the bill of fare is a button. Having chosen his dish, the customer presses the button, and immediately the number of the table and the order are displayed on a recorder in the kitchen, while an electric alarm bell is rung to attract the notice of the cook or attendant. The apparatus in the kitchen automatically issues a ticket with the number of the table in the restaurant, the nature of the order and the amount to be collected from the diner. A duplicate of the ticket is kept on an endless tape, so that an absolute check may be kept on both money and goods. When the ticket is dropped from the electric printer in the kitchen into the tray, the order can be prepared and delivered with the bill by the waitress at once. Where it has been used in New Zealand, the electric waiter has proved a great success.—*Brit. Aus.*

PARLIAMENTARY.

Metropolitan Railway Bill.

THE Metropolitan Railway Co.'s Bill, which passed the House of Commons' Committee a few weeks ago, came on July 16th and 17th before Lord Falkland's Select Committee of the House of Lords. As originally drafted, the Bill asked for powers to construct a new railway at Hammersmith to join up with the authorised line of the Great Western Railway to Ealing, and also for powers to construct a new line from Rickmansworth to Watford, and thus to create a new route from the latter town to the metropolis. The Ealing proposal was rejected by the House of Commons' Committee, and consequently the chief matter before the Lords' Committee was the extension to Watford, which was opposed by the London and North-Western Railway Co.

MR. R. H. SELBIE, general manager of the Metropolitan Co., gave evidence in support of the Bill, stating that at present between Baker Street and Harrow the company now run about 200 trains daily, and these trains could be extended to Watford as the traffic demanded.

Evidence of a local character was also called on behalf of the proposal.

MR. F. REA, general manager of the London and North-Western Railway, whose line is being electrified to Watford, contended that, in view of the facilities now given and intended to be given, the extension was not required.

The Committee passed the preamble of the Bill, subject to a clause being inserted to provide for the construction of a bridge by the Metropolitan Co., which will permit of the extension of the London and North-Western Co.'s line from Croxley Green. Widenings of the Metropolitan Co.'s line between Finchley Road and Kilburn were also passed. The proposal of a subway for foot passengers at King's Cross was withdrawn.

Midland Railway (London, Tilbury and Southend Railway Purchase) Bill.—Having passed the preamble of the above Bill, Sir J. Compton Rickett's Committee sat on July 16th to further consider the clauses, and were chiefly concerned in dealing with the running powers of the Great Northern Railway Co. over the line. The Committee decided to confine such powers to the dock traffic or to any future docks that the Port of London Authority might construct on the northern side of the river. The promoters asked the Committee to insert a clause to the effect that the Great Northern Co. should be obliged to electrify their trains running over the Tilbury line when the Midland Railway adopted electric haulage, but the Committee considered this was a matter which should be left to agreement or to the decision of the Railway Commissioners.

Light Railways Bill.—Answering a question by Mr. Munro on Monday, the Prime Minister said he was aware of the desirability of the early passage into law of the Light Railways Bill, but he was not sure that it could be taken before the autumn adjournment. He was aware that at least one railway in the north of Scotland, which had the support of the Board of Trade, was being delayed by the non-passing of the Bill.

Second and Third Readings.—In the House of Lords on July 23rd the National Electric Construction Co.'s Bill was read a second time, and the Preston, Chorley and Horwich Tramways Bill passed third reading.

LEGAL.

BRITISH WESTINGHOUSE ELECTRIC AND MANUFACTURING CO LTD., *v.* THE UNDERGROUND ELECTRIC RAILWAYS CO. OF LONDON.

IN the House of Lords on Friday, July 19th, the Lord Chancellor, and Lords Ashbourne, Macnaughton and Atkinson delivered their reserved judgment in the appeal by the plaintiffs in this action, seeking to reverse the decision of the Court of Appeal in favour of the respondents with reference to arbitration proceedings. The matter had reference to a contract for the supply of £225,000 worth of plant for generating the electric energy required for the working of the defendants' railways. This plant included eight turbines, which were admittedly not satisfactory on a given coal consumption, and the respondents substituted Parsons machines for them. The appellants claimed for £83,000, the balance of the purchase price of the turbines supplied under the contract, and the respondents thereupon counterclaimed for damages for breach of contract. The matter was referred to arbitration, and the arbitrator found that the respondents were entitled to £15,000. The appellants contending that they were liable only in nominal damages, and were entitled to the full balance of the purchase money, took the matter to a Divisional Court, which held that that contention was not well founded, and that the respondents were entitled to recover from the appellants, as damages, the purchase and installation of the Parsons machines. The matter was thereupon referred back to the arbitrator, who made his award on February 23rd, 1911, finding that the appellants were not entitled to recover anything from the respondents, while the respondents, on the basis of the decision of the Divisional Court, were entitled to recover from the appellants £15,394. The appellants moved the Divisional Court to set aside that award, but the Court were of opinion that they were bound by the previous decision. The matter then went to the Court of Appeal, which, by a majority upheld the award.

The LORD CHANCELLOR, who read the judgment of the House of Lords, said two questions were raised before the Court of Appeal. One was whether it was competent for that Court to review the opinions given by the Divisional Court to the arbitrator. Lords Justices Vaughan Williams and Kennedy had come to the conclusion that the action of the respondents in purchasing the new machines had given them advantages in the conduct of their business subsequent to the breach of contract, but the appellants were not entitled to claim the benefit. On the other hand, Lord Justice Buckley had thought that the appellants were entitled to have a decision of the arbitrator as to whether the purchase of the new machines was reasonable and prudent for the purpose of mitigating the damages apart from its prudence for their own pecuniary advantage, and whether it was the only reasonable and prudent course which they could have taken to mitigate the damages. For instance, they could have purchased Parsons machines of 5,500-KW., which was the standard efficiency, under the contract, instead of purchasing, as they in fact did, Parsons machines of 6,000 KW. On that point, Lord Justice Buckley had considered the appellants had had no decision of the arbitrator, and were entitled to it. He (the Lord Chancellor) was unable to agree with the majority of the Court of Appeal, but he could not wholly agree with the view taken by Lord Justice Buckley. The arbitrator had found clearly that the effect of the superiority of the Parsons machines and their efficiency in reducing working expenses was, in point of fact, such that all loss was extinguished, and that actually the respondents made a profit on the course they took; though not bound to purchase machines of a greater power than those contracted for, they, in fact, took a wise course in doing so, and with pecuniary advantage to themselves. Moreover, they had used the appellants' machines for several years, and had recovered compensation for loss occasioned by these machines not being up to the standard specified in the contract. The arbitrator had found that after that period it was a reasonable and prudent course to purchase the more powerful machines, and thereby all the remaining loss and damage had been wiped out. There were, however, certain broad principles that were well settled. Anyone who had proved a breach of bargain must, so far as money could do it, be placed in as good a position as if the contract had been performed, but that, however, was qualified by an obligation on the plaintiffs to take all reasonable steps to mitigate the loss consequent on the breach, and he was debarred from claiming any part of the damage arising from his neglect to take such steps. In his (the Lord Chancellor's) opinion the principle which applied in this case was that which made it right for a jury or arbitrator to look at what actually happened and balance the loss and gain. Apart from the breach of contract, the lapse of time had rendered the appellants' machines obsolete, and, as men of business, the respondents would be doing the only thing they could properly do in replacing them with new and up-to-date machines. For those reasons the special case stated by the arbitrator on the points of law had been wrongly answered by the Courts below, and the result was that the award could not stand, but must be sent back to the arbitrator with a declaration that the contention of the appellants so far—but only so far—as they contended that the several facts relied upon by them were relevant matter to be considered in assessing the damages was right, and the contention of the respondents on the second question was wrong.

The appeal was accordingly allowed, with costs, the appellants being also awarded the costs in the Court of Appeal and the Divisional Court upon the motion to set aside the award.

THE TELEPHONE ARBITRATION.

(*Continued from page* 89.)

THE ATTORNEY-GENERAL, at this juncture, said he was pleased to inform the Court that Mr. Danckwerts and himself had agreed upon the terms of an interim award. It was unnecessary to trouble the Court about the details. They would all be found in the document he intended to hand up. It was signed by his learned friend, Mr. Danckwerts and himself, and he proposed to ask the Court to make the award in the terms of the document. The document in question was then handed up to Mr. Justice Lawrence, and was perused by the Commissioners. Its contents were not disclosed.

MR. JUSTICE LAWRENCE said he supposed it would be necessary for the Court to make the award, and the Attorney-General replied in the affirmative, and said its object was that the Post Office might pay over to the Telephone Co. at once the amount due under the award.

[It will be remembered that a few days previously the question of an interim award was mentioned to the Court, and in connection with it, a sum of £3,500,000 was mentioned, the parties having agreed upon certain figures in the plant items. Sir Alfred Cripps, K.C., mentioned at the time that the company were anxious to obtain the sum to pay over to the preference shareholders, and on behalf of the Postmaster-General, no objection was raised to an interim award, Sir J. Simon stating that if such award were made the Postmaster-General would avoid paying some 5 per cent. interest on the money up till the time the final award was made, and that interest would represent a large sum of money.]

Mr. Cook, assistant engineer-in-chief to the company, was recalled and gave further details as to figures of plant cost, &c.

The first witness called on behalf of the Postmaster-General was MR. J. F. C. SNELL, M.I.C.E., who said his firm were advisers on all telegraphic and telephonic matters to the South African Government, the New Zealand Government, and the Crown Agents for the Colonies. In company with Mr. Andrew Young, chief valuer to the L.C.C., and officials of the Post Office, he had prepared the tables of figures which he now put forward. Witness had supervised the preparation of the fundamental prices on which the reinstatement cost was arrived at. The quantities used were agreed quantities. He had taken the fundamental prices for each of the classes of material scheduled in the inventory on the prevailing market prices at or about December 31st, 1911, the date of the sale of the system. Then for the actual contract work he had taken the records of the Post Office based upon actual contracts—not hypothetical tenders—carried out for work exactly comparable with the work which they were now valuing. Those contracts included all the items the contractor charged—contingencies, insurances, contractors' profits, and ordering and storing material—but in some of the materials he had to make adjustments in order to get at the proper costs by altering some of them, so as to bring them into exact alignment with the specifications of the company. Then he had added engineering fees, for supervision and designing, and the total represented the cost of construction. Dealing with the item of iron piping, witness said he thought £121 was a fair price for a mile run of 3-in. cast-iron piping delivered free on rail at the works, or 1s. 4½d. per yard. Witness gave further evidence with regard to figures for materials and freight charges. He said that there were 68 centres throughout the company's system which he had investigated on behalf of the Post Office with regard to freight charges. He had taken the actual length of piping used in each centre, and had converted it into weight. Then he had taken three actual sources of supply for this piping—viz., foundries in Wolverhampton, Nottingham and Sheffield—and by this means had arrived at the station-to-station rate between the foundries and the 68 centres in question. The calculation was not based on mere assumption but on actual material supplied to the various centres. Taking the whole of the 68 centres, he arrived at a total weight figure of 38,099·27 tons and a total freight charge of £15,126 2s. 8d., or an average of practically 8s. per ton.

SIR J. SIMON said the National Telephone Co. relied upon what they said was their experience in arriving at their figures under this head. They had assumed that a certain proportion of the material would be carried in small parcels and another percentage in 2-ton lots and another in 4-ton lots. The Post Office, whether they were right or wrong, had assumed that they would get this material carried in substantial quantities, and therefore their figure for station-to-station rates was based on the calculation that the lots carried were 4-ton lots. In arriving at the source of supply for cast-iron piping, they had relied on experience and geography, and he did not think there was any error in that direction.

SIR A. CRIPPS said the substantial point between the parties was whether this station-to-station rate could be applied in all cases, subject, of course, to the question of quantities carried.

MR. BUCKMASTER said that witness's tables showed the figures for 4-ton, 2-ton and 1-ton lots, all differently dealt with, and Sir Alfred Cripps could see at once the average figure obtained per ton.

MR. JUSTICE LAWRENCE said he was living in hopes that some agreement might be arrived at with regard to the freight question.

SIR J. SIMON assured the Court that both sides were working in that direction.

SIR A. CRIPPS said that a point between them was whether the whole calculation should be worked out on the 4-ton basis.

Witness added that in arriving at a figure of 8s. per ton, they had not lost sight of the fact that in certain cases the lots of material dispatched might be less than four tons, but taking this into consideration they considered the 8s. to be a fair figure.

Witness, further explaining the method he had adopted in valuing the plant, said he had fixed the total cost of construction at £1,372,469. For supervision he would add 5 per cent., which was the general engineering percentage for supervising and administering construction.

The SOLICITOR-GENERAL: By making that addition you arrive at the figure which adequately represents the reinstatement cost?—Yes, I think the total of £1,441,093 is a fair cost for this particular section.

Counsel then proceeded to contrast the company's figures with those of the Postmaster-General and asked witness if the company's figure for the estimated cost of construction of 3,428·6 miles of single duct as on December 31st, 1911, was £2,840,755, or £828 per mile, and the Postmaster-General's figure, £1,441,093, or £420 odd per mile of single duct?—Witness agreed.

Witness said his tables in respect of wrought-iron piping were based on the actual prices taken from contracts, and the same remark applied to the laying of the conduit in the earth. Mr. Snell then proceeded to deal with the cable cost, &c., and gave figures with regard to the 68 centres for 600-pair dry-core lead-covered underground cable. He based his figures as on December 31st last. He worked out the actual cost per mile of this particular class of cable at £966·058. Witness, continuing, said that these figures were arrived at with the assistance of eminent cable manufacturers, including Messrs. Callender. Their instructions were that the prices obtained were to be for cables strictly in accordance with the N.T. Co.'s specifications. The materials were also to be based on the market prices ruling for copper, lead, tin, &c., on the nearest dates available to the date of sale. Those dates were December 2nd, 1911, and January 2nd, 1912. The prices were to include the testing of the cables at the maker's works, the coiling of the cables on the drums, the packing of the drums, the manufacturer's usual special charges and profit, and delivery at the works. In this way they arrived at the figure of £966·058 per mile, and he had checked it by quotations submitted to his firm for the delivery of practically the same cables to a Colonial Government. They had also gone so far as to obtain an independent tender from an eminent firm of cable makers.

SIR A. CRIPPS said that he admitted the prices given were fair as based on December 31st, but the question between the parties was whether that was a fair basis to calculate upon. There was also a dispute between them as to the question of wastage.

Proceeding with his evidence, MR. SNELL dealt with the question of wastage. The waste allowance per mile was 4 ft. multiplied by 20 joints. As a rule in contract work, cables were ordered, if they were of a large size, to suit the particular distances between the manholes which had already been constructed. Therefore there ought to be nothing but a very trivial waste upon what might be termed the manufacturer's length of the cable. The conduits and manholes were put in on the plans, and the cable ordered accordingly. The parties had agreed on the number of joints in a mile, viz., 20, and these were the places at which the cable had to be cut; allowing a length of 2 ft. wastage at each end of the cable at every joint, that made 4 ft. wastage per joint. He considered that was an ample allowance, and would not be exceeded in actual practice. Of the wastage, 75 per cent. was recoverable from the manufacturer. Making further comparisons between the company's figures and those of the Postmaster-General, witness said he estimated the cost of constructing the company's underground cables at £1,962,659 odd; that included supervision and consulting engineers' charges.

MR. BUCKMASTER: It is roughly £2,000,000 on our side, and £3,500,000 on the company's side.—Witness said he estimated the cost of poles, including engineering charges, at £1,662,981, or an average of £3,889 per pole, compared with the company's figures of £2,614,444, or £6,115 per pole. The distribution wiring was in shorter lengths than what he might call the ordinary "straight through" wiring and that obviously necessitated more labour, also the wiring on house tops incurred more labour than wiring from the ground level. Therefore, in arriving at his figures for wiring, he had added 10 per cent. on the ordinary "straight through" work for the shorter distribution work and 20 per cent. for the more difficult over house work. These figures were, of course, largely arrived at by judgment, but he thought they were fair.

In reply to SIR JAMES WOODHOUSE, MR. BUCKMASTER said the most serious difference between the parties was the question of freight. The Post Office had calculated the weight of material as being at the centres, whilst the company contended that it should have been taken at the distributing townships round the centres.

SIR A. CRIPPS said there was a question of special rates and class rates to be considered.

MR. JUSTICE LAWRENCE: I think the parties would be very wise if they could adjust the difference. It is no good fighting a broad view to the last penny.

WITNESS said the total figure for the cost of construction of bare wire was £2,037,811, to which had to be added consulting engineers' charges of 5 per cent., making a grand total of £2,139,702, or £8·3 per single mile. The company's figures were £3,348,651, or £12·97 per mile. The total cost of aerial cables was estimated at £497.987, or £9·406 per mile, as against the company's estimate of £1,017,055, or £19 per mile. There were 98 centres. The figures for exchange equipment were estimated on behalf of the Postmaster-General at £1,505,139.

The SOLICITOR-GENERAL pointed out that this figure did not include the Glasgow exchange, because the Postmaster-General took exception to acquiring that exchange altogether.

Witness, continuing, said the company's figure, including the Glasgow exchange, was £2,642,344.

In the course of further evidence, MR. SNELL said the estimated cost of subscribers' instruments, &c., was put by the Post Office at £2,369,735, compared with the company's claim of £3,759,393. With regard to the total contractors' costs, witness said there were only 2½ millions difference between the parties, but when they came to arrive at the total cost of construction, the company added charges which increased the difference to over eight millions. In other words, the figure for the total cost of construction was put by the G.P.O. at £11,617,166, whilst the company estimated it at £19,499,309. Dealing with insurance and maintenance charges, witness said that the period of contractors' insurance and maintenance charges of an exchange slightly overlapped the period when the exchange became revenue-earning, because it was customary to begin to employ the exchange before it actually left the contractors' hands or was finished.

(To be continued.)

SUNDERLAND DISTRICT ELECTRIC TRAMWAYS, LTD

IN the Chancery Division on Tuesday, July 23rd, Mr. Justice Swinfen Eady had before him a petition by the company to sanction a scheme for the rearrangement of certain portions of the capital. There was also a summons taken out in a debenture-holder's action to sanction an agreement by which the proposed new issue under the scheme was to be under-written.

MR. GORE BROWNE, K.C., for the company, said it was formed in 1903 for the purpose of working the tramways in the colliery districts adjoining Sunderland. Owing to subsidences in the soil difficulties had arisen which necessitated very important and expensive repairs. The ordinary capital of the company was not

affected by the scheme, but subsequent classes of capital were. Five per cent. debentures to the amount of £160,000 were issued in 1903, and there were also a number of loans secured by a charge dated December, 1906. Such loans amounted to £19,700. In December, 1907, with the sanction of the debenture-holders and the holders of various charges, £20,000 of prior lien bonds at 5 per cent. were put in front of them and secured by a deed. The bonds were redeemable at 5 per cent. bonus. The company earned sufficient profits to pay interest upon its securities down to 1910, but did not earn sufficient to pay any dividend upon its share capital. On May 28th, 1910, the holders of the £160,000 5 per cent. debentures commenced a debenture-holder's action on the ground that the company's property was in jeopardy, and Mr. Eves was appointed Receiver. In 1910 Mr. Eves was also appointed Receiver for the prior lien bondholders, and the actions were consolidated. The tramway was worked until May, 1911, by the Receiver, and had since been worked by the directors; but the Receiver had been paid the money. Altogether there was a balance in hand of £16,000. The certificate showed that the outstanding prior lien bonds to the amount of £11,025 had been issued, and £160,000 of debentures, in addition to the loan of £19,700 secured by a third charge. No interest had been paid since December, 1910. A considerable sum was now required to put the line into proper order, owing to sinkages which had occurred. It was proposed to create an issue of 5½ per cent. new prior lien bonds, but to issue only £20,000 of it at present, and out of the proceeds of that issue to pay off in full the whole of the existing prior lien bonds. For the rest it was proposed to create first income bonds up to £72,000 carrying interest at 5 per cent., such interest being subject, among other things, to payment of a sinking fund. The capital was to be charged further by the creation of a second series of debenture bonds at 5 per cent. to an amount not exceeding £12,000.

His LORDSHIP sanctioned the scheme, and also the agreement by which the underwriter agreed to underwrite the new classes of securities to be issued under the scheme.

THE REASON MANUFACTURING CO., LTD.

IN the Chancery Division, on Monday, Mr. Justice Swinfen Eady heard a petition by this company to sanction a reduction of capital by wiping off the amount of a debit balance of £32,000.

MR. ASHTON CROSS appeared for the company, and said the reduction did not involve any diminution of liability on the unpaid shares. The company was formed in 1900 to take over the business of an old electrical company. For the first few years it was a very successful concern, and paid dividends ranging up to 10 per cent. Then came a change in the fortunes of the company. It was unsuccessful, and as a result of its trading it found itself with a debit balance. This balance went on increasing until now the company were anxious to get rid of it. It was proposed to reduce the capital from £70,000 divided into £1 shares, to £37,533 divided into 61,803 shares of 9s. 6d. each and 16,394 share of 10s. each. The reduction was to be effected by cancelling capital lost or unrepresented by available assets to the extent of 10s. 6d. on each of the 61,803 £1 issued shares, and by converting the remaining 8,197 unissued shares of £1 into 16,894 shares of 10s. each. It was proposed at the same time to issue these 16,894 shares and call them preference shares bearing interest at 6 per cent.

His LORDSHIP sanctioned the scheme.

INDIAN ELECTRIC SUPPLY AND TRACTION CO., LTD.

IN the Chancery Division on Tuesday, Mr. Justice Swinfen Eady had before him a petition by the company to confirm a reduction of capital. It was explained by Mr. Gibson for the petitioners that the company was incorporated in 1905 to establish electric tramways and work electrical enterprises generally in India. It was formed with a capital of £600,000 divided into 120,000 shares of £5 each. Of these the company had issued 26,009 shares fully paid up, making the issued capital £130,035, and it was proposed to reduce the shares from £5 to £3, and thus wipe out a loss of £52,014.

His Lordship sanctioned the scheme.

WORKMEN'S COMPENSATION CASE.

GIVING judgment in a stated case in an appeal under the Workmen's Compensation Act, between the Wemyss Coal Co., Ltd., and John K. Symon Buckhaven, who was injured in attempting to board a car, Lord Justice Clark said the boy left a fixed stopping place and went towards the coming car. No one invited him to go forward and meet the running car and get on while it was going at 5 miles an hour. His Lordship could not assent to the view that because a boy might not run much risk in mounting a car moving at that rate any accident which occurred was to be regarded as incident to his employment. The rule as to stopping-places was established because there was danger, and the person who broke the rule did so at his own risk. The act was not necessary to the fulfilment of his duty, and in no way facilitated his employers' business

Barnstaple Lighting.—The T.C. has decided to extend the mains so as to supply current for the lighting of Pilton Church.

BUSINESS NOTES.

A Perpetual Calendar.—MESSRS. EVERETT, EDGCUMBE AND CO., LTD., of 117, Victoria Street, S.W., have sent us a very ingenious perpetual calendar, mounted on a representation of one of their 6-in. dial ammeters. The numbers representing the dates of the month are printed on a movable chart in such a way that, on setting the first day of the month against the correct day of the week, the calendar is right for the whole month; it is easily adjusted at the beginning of each month, and is printed in bold, clear figures. The idea appears to be quite novel in this form. Messrs. Everett, Edgcumbe are distributing the calendars to their friends, and will be pleased to forward one to any of our readers.

Annual Holidays.—MESSRS. E. BROOK, LTD., of Colne Road, Huddersfield, announce that their works will be closed from Friday night, August 2nd, to Monday morning, August 12th, for the holidays.

THE MIDLAND ELECTRIC MANUFACTURING CO., LTD., of Rea Street, South Birmingham, will close from Saturday, August 3rd, to Monday morning, August 12th.

THE BRITISH PROMETHEUS CO., LTD., of Birmingham, are closing down their works for the annual holidays and stock-taking on Wednesday, 31st inst., and will reopen on August 12th. The London showrooms will be open as usual.

MESSRS. WILLANS & ROBINSON, LTD., of Rugby, announce that their works and offices will be closed from August 2nd until August 12th.

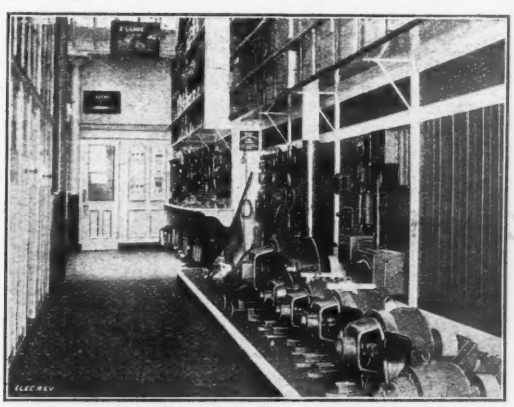
MESSRS. MUIRHEAD & CO., LTD., of Elmers End, Kent, will close their works from August 3rd to 15th inclusive.

THE WESTINGHOUSE BRAKE CO., LTD., of York Road, London, N., will likewise be closed for the annual holidays from the evening of August 2nd until the morning of August 12th.

In all the above cases a small office staff will deal with correspondence.

Russia.—The Russian Customs authorities have lately issued an amendment with regard to the import duty on electric incandescent lamps with metal-filaments, the duty having been increased from 30 to 65 roubles per pood in the case of lamps (*a*) mounted, and from 60 to 90 roubles as regards (*b*) not mounted lamps. A rouble is approximately 2s. 1½d., and a pood 36 lb.

Veritys' Glasgow Depôt.—Owing to an increase in their Scottish business of a specially encouraging nature, MESSRS. VERITYS, LTD., have opened a supplies department and machinery and fixture showrooms on an extensive scale at 51, Waterloo Street, Glasgow. The depôt, both in external appearance and internal arrangements, is very similar to their head depôt at 31, King Street, Covent Garden, London, of which we gave an account in our issue of October 20th, 1911. At the entrance one comes across an extensive display of the productions of their engineering department—"Aston" motors, ready for delivery—a complete range of "Aston" switchgear, "Aston" arc lamps, and other interesting adjuncts. From this one passes to the supplies department, fitted up in the usual manner for the ready handling of over-counter trade, which is such an important item in a busy metropolis like Glasgow. The showroom has been built into the depôt, and has been laid out and decorated by Messrs. Wiley and



THE ENTRANCE TO VERITYS' SHOWROOM AT GLASGOW.

Lockhead. Here, not only have the firm displayed their lighting fixtures in their periodised manner, but they have also arranged an exhibition of lighting fixtures to show the application of up-to-date principles of light distribution—an important feature with the public to-day. In addition to the above, there is also a display of radiant lanterns, and other street-lighting apparatus, also of "Aston" heating and cooking appliances, calculated to appeal to the public. We are informed that large stocks are being kept at this depôt in order to give prompt delivery, and these stocks are backed by the completed extension of the works, which was in

hand last year, enabling them to give quick deliveries of "Aston" motors and switchgear, and, finally, supported by their new large delivering warehouse in London, where some thousands of pounds worth of stock has been accumulating for quick dispatch to any part of the country.

Meeting of Creditors.—H. G. NORTON & CO., LTD., cycle, motor and electrical engineers, Cheltenham and Gloucester.—Pursuant to the provisions of the Companies' (Consolidation) Act, a meeting of creditors of the above was held on 17th inst. at the Imperial Hotel, Birmingham. The chair was occupied by Mr. G. G. Poppleton, of Messrs. Poppleton & Appleby, chartered accountants, Corporation Street, Birmingham, who had been appointed to act as joint liquidator of the company as the representative of the trade creditors. According to the statement of affairs presented the liabilities amounted to £13,517, while the assets were estimated to realise £9,245, or a deficiency as regarded the unsecured creditors of £4,272. As regarded the contributories there was a deficiency of £13,774. That loss was principally due to two items which had not previously been written off—bad debts and differences in the value of the stock. The company had never paid any dividends, and had been hampered from the start by lack of capital and heavy expenses. The principal creditors were Humber, Ltd., whose claim amounted to £2,300. Their claim was quite in order, although a counterclaim was made against them. After some discussion a resolution was passed in favour of the voluntary liquidation of the company with Mr. G. G. Poppleton and Mr. L. Vizard as joint liquidators. A committee of the principal creditors was elected, and the liquidators were authorised, if the necessity arose, to take proceedings to set aside debentures to the extent of £3,200 issued to the vendor.

Catalogues and Lists.—MESSRS. F. DARTON & CO., 142, St. John Street, London, E.C.—48 pp. catalogue, giving illustrations and prices of a variety of electric novelties, including miniature lamps, flash lamps, table lamps and other small electric lighting sets, dry batteries, small motors and dynamos and parts of same, demonstration motors, bells, telephones, advertising novelties, medical coils, vacuum tubes, &c.

MESSRS. W. GEIPEL & CO., St. Thomas Street, London, S.E.—Four-page illustrated list, giving particulars and prices of vulcanised rubber insulated aluminium electrical conductors, from 1/22 to 37/14 S.W.G. A table is given, compiled by Mr. Geipel, showing diameters, areas, resistances, weights and current for wires of various S.W.Gs. Owing to the present price of copper, a saving of from 5 to 25 per cent. (according to the size of the conductor) can be shown by the use of aluminium insulated conductors of the same power transmitted and the same drop in the line.

THE BRUSH ELECTRICAL ENGINEERING CO., LTD., Loughborough.—Art brochure of 70 pages, with coloured frontispiece, entitled "The Book of the Steam Turbine." The book is profusely illustrated giving views of complete turbines and parts of same, and it describes the principles of the machines.

MESSRS. ADNIL ELECTRIC CO., LTD., Adnil Buildings, Artillery Lane, London, E.C.—8-page illustrated pamphlet showing a variety of telephone and signalling apparatus for coal and gold mines, railways, ships, and works.

THE BRITISH THOMSON-HOUSTON CO., LTD., Rugby.—20-page price list (No. 363) giving very full particulars of the B.T.-H. "Fabriol" pinions. A number of pages give detailed tables of prices of various sizes, and there are also rules for determining dimensions of spur pinions, diagrams showing velocity at pitch line and H.P. per in. of face, and a data sheet.

MESSRS. UNION ELECTRIC CO., LTD., Park Street, Southwark, London, S.E.—New complete list (over 40 pages) relating to switchboard instruments, divided by a thumb index into five sections as follows: Electromagnetic instruments for D.C. or A.C.; moving-coil instruments for D.C.; electro-dynamometric ampere, volt and wattmeters and power factor indicators: induction Ferraris type A.C. instruments, and electrostatic voltmeters. The list is fully illustrated, and prices and code-words are clearly set out in tabular form.

MESSRS. SEEAR, PAGE & CO., 16 and 17, Devonshire Square, London, E.C.—Small pamphlet explaining what Plas-mica is (a soluble form of mica), and its uses and price.

THE LONDON ELECTRICAL TRADING CO., LTD., Palmerston House, Old Broad Street, London, E.C.—Catalogue comprising a number of leaflets, giving first general and then descriptive illustrated and price information relating to Bastian electric-heating apparatus. The contents include:—The Bastian "A," "F," "FF" and "G" type heaters, standard heater frame, the lantern-type heater, ships' heaters, "Exchange" and "Admiralty" types, table heater or toaster, kettles and saucepans, hot-plates and ovens. Special attention may be directed to the "Pygmy" heater, which is a very cheap line to run from the house lighting circuits for many household and nursery purposes. It is described as cheaper than the methylated spirit lamp, and it will cost for half an hour per day, with electricity at 6d. per unit on the lighting circuit, less than 3d. per week, or for one hour per day on the heating circuit at 1d. per unit less than 1d. per week.

MESSRS. KANSON & CO., 1, Argyll Street, Oxford Circus, London, W.—Card giving prices of Cross metal-filament lamps.

MESSRS. SIMPLEX CONDUITS, LTD., Charing Cross Road, London, W.C.—Supplementary list D.10 giving particulars of their motor service and house service fuse-boxes. They are the usual split type of box with bushed inlets and outlets, and a type with a boss at either end which can be drilled and tapped for screwed conduits: both may be obtained designed for ordinary fuse wire, or for Simplex enclosed fuses. Those for 500-volt circuits are for cartridge fuses only. Prices are stated. The double-pole fuse with a double switch mounted complete on teak board, is also illustrated in this leaflet.

THE ELECTRICAL CO., LTD., of Charing Cross Road, W.C., have announced reduced prices of flat-irons of from 4½ to 10 lb. weight.

THE EDISON AND SWAN UNITED ELECTRIC LIGHT CO., LTD., 36 and 37, Queen Street, Cheapside, London, E.C.—The company has issued a hanging showcard very effectively depicting one of its "Ediswan" fans, also several pieces of publicity literature relating to these manufactures, among them being No. H 2,248, giving a brief specification and illustrations with prices of the firm's special types of convertible table or bracket pattern, with swivel and trunnion movement, and ring or porthole fans.

MESSRS. ELLIOTT BROTHERS, Central Buildings, Westminster, S.W.—Two new lists have been issued. No. 51 (20 pages) contains a general specification, illustrations, prices, and so forth of D.C. switchboard instruments, moving-coil type (round, edgewise and sector patterns), shunts and resistances for ditto, also soft iron types (round and edgewise patterns). The prices show a large reduction on those in previous lists. No. 57 (16 pages) deals with portable testing sets, and several new patterns of these are listed.

MESSRS. SIEMENS BROS. DYNAMO WORKS, LTD., Tyssen Street, Dalston, London, N.E.—Reference was made here some months ago to the firm's framed cartoons "Selling the Tantalum Lamp," and "Making the 'Wotan' Lamp." These are now being supplied to contractors doing business in these lamps, and the firm will be pleased to forward a pair upon request.

THE SUN ELECTRICAL CO., LTD., 118-120, Charing Cross Road, London, W.C.—List describing with illustrations, and giving prices of, wireless china "Sunlite," the reflecting surface of which is of white glazed china. Instructions for fixing are included.

THE POWER PLANT CO., LTD., West Drayton.—Booklet No. 4, dealing with double helical gearing and its application in electric generating stations.

MR. G. BRAULIK, 8, Lambeth Hill, London, E.C.—16-page catalogue of electro-medical apparatus, giving illustrations and prices of induction coils, electrodes for medical coils, magneto machines, electric vibrators, &c.

THE HART MANUFACTURING CO., 77, Rochester Row, Westminster, London, S.W.—Leaflet describing the Hart series-parallel heater switches (three heats) for use on heating and cooking apparatus. A connections diagram and statement of prices are given.

THE ANTI-WINDOW-STEAMING CO., LTD., 52, Gracechurch Street, London, E.C.—Small pamphlet relating to an electrically-operated apparatus for the prevention of steamy windows. A centrifugal blower forces cold air through a nozzle on to the surface of the window preventing accumulation of moisture.

Japan.—The Allgemeine Electricitäts Gesellschaft have recently supplied the cable required to connect up the central station at Kobe, Japan, with two sub-stations for the Kobe Electric Light Co. The cable is iron tape armoured, and consists of asphalted lead cable with paper insulation and three sector-shaped, stranded copper conductors, each having a section of 64·52 sq. mm., and transmitting current at a pressure of 11,000 volts. The A.E.G. have also supplied 10 single-phase oil transformers for the sub-stations as well as the switchgear for the main and sub-stations.

Osrams at the Palace.—We have received from the GENERAL ELECTRIC CO. an interesting illustration showing the superbly-decorated and brilliantly-illuminated interior of the Palace Theatre, London, as arranged for the recent visit of Their Majesties King George and Queen Mary. The floral decorations of the auditorium were illuminated mainly by Osram lamps, of 25 and 32 C.P., about 2,000 being supplied for that purpose. The dome of flowers taking about 600 Osrams, and the centre light, composed of about 100 Osrams, were particularly effective.

Book Notices.—*The University of Liverpool Engineering Society Journal*, of which the first number has just issued from the University Press of Liverpool (price 1s. 6d. net), is produced in a manner worthy of its origin; it is intended to provide a record of the transactions of the Society, with papers and articles on engineering matters, and is edited by Mr. J. F. Gill, M.Sc., with the aid of an advisory board comprising other members of the University staff, including Profs. Marchant, Perrott and Watkinson, and the President of the Society, Mr. E. L. V. Dakin. A serial by Mr. E. J. Rimmer on "The Law Affecting the Engineer" is begun in this issue, and several abstracts and articles are included.

Everyday Uses of Portland Cement. London: Associated Portland Cement Manufacturers (1900), Ltd. Price 1s. 6d. net.—This is the second edition of a useful treatise, bringing together a great deal of valuable information as to the nature and qualities of Portland cement, its treatment and applications. The book is abundantly illustrated, and contains the most detailed instructions and memoranda, together with numerous examples of concrete construction, showing the extraordinary versatility of the material. Amongst other items of interest to electrical engineers may be mentioned concrete telegraph and transmission line posts and standards, telpher line supports, chimney shafts, water towers, coal bunkers, water mains, and buildings of every description.

"Red Book," No. 166, of the British Fire Prevention Committee describes fire tests with glass, the subject being the "Copperlite" glazing of Messrs. Hayward Bros. & Eckstein, Ltd. It was found that this glazing afforded a most useful amount of protection from the effect of an external fire—provided that the glazing was properly fixed.

The Valveless Car Handbook is an admirable account of the construction and working of the "Valveless" motors, issued by Messrs.

David Brown & Sons (Huddersfield), Ltd. The ingenious engine which forms the chief feature of the system has two cylinders side by side, with shafts geared together, and works on the two-stroke cycle, and, if not actually innocent of valves, comes as near to that condition as is conceivably possible. The description of the mechanism is clear and well illustrated.

"The Post Office Electrical Engineers' Journal." Vol. 5, Part 2. July, 1912. Special Number. London: H. Alabaster, Gatehouse and Co. Price 2s. net.

"*Journal* of the Franklin Institute." Vol. CLXXIV, No. 1. July, 1912. Philadelphia: The Institute. Price 50 cents.

"Boletin de la Sociedad de Fomento Fabril." May, 1912. Santiago, Chile: The Society.

"*Journal* of the American Society of Mechanical Engineers." Vol. 34, No. 7. July, 1912. New York: The Society. Price 35 cents.

"*Bulletin* of the Association des Ingenieurs Electriciens." June 29th, 1912. Liége: The Association.

Meter Testing.—In our advertisement pages to-day will be found a full statement of the rules and scale of fees proposed by the L.C.C. in connection with the testing by the Council of electricity meters, in place of those now in force.

Electric Irons.—As an example of the durability of electric irons we quote the following:—Over five years ago the G.E. Co. supplied to one of their customers a 4-lb., 100-volt Domestic electric iron, which, it is reported, has ever since been in almost daily use until a week or so ago, when it was returned to the company owing to its owner moving to a district served at a higher voltage. In spite of its hard life, it is still in perfect working condition, and can now be seen in operation at the showrooms of the company in Queen Victoria Street.

Bankruptcy Proceedings.—ROBERT EDWIN WALKER, Eign Road, and 16, Widemarsh Street, Hereford, electrical engineer, &c.—An application was made by Mr. F. Carver (Messrs. Allen and Carver), to his Honour Judge Harris Lea, sitting at the Shire Hall, Hereford, last Tuesday week, for the discharge from bankruptcy of the above debtor. He said that the debtor sold a half share of the business to a Mr. Vickery, at which time his assets were valued at £320, and, if they had been properly realised, they would have been sufficient to pay over 20s. in the £, the liabilities being only £229, but although the affairs went into the hands of a solicitor, they got into such a muddle that the assets realised only £128, instead of £181, as estimated. Debtor was pressed by a creditor and filed his petition. A dividend of 5s. 9d. in the £ was paid on proofs for £223. The debtor attributed his failure to complications arising in consequence of entering into a partnership which prevented him from paying his own debts, whilst at the same time his partnership and other assets were insufficient. The Official Receiver made no objection to the application. The Judge remarked that the debtor's mistake was in selling his half share, and he had evidently been more sinned against than sinning. His Honour gave a full discharge on his paying £5.

GEORGE EDWARD HERVEY, 24, Susans Road, Eastbourne, gas and electrical engineer and ironmonger. The public examination of the above-named debtor was held at the Town Hall, Eastbourne, on Tuesday last week, when the debtor was legally represented by Mr. Reed. He stated that he started business with a partner in 1906, but had since paid him out. His liabilities amounted to £241, and the book debts totalled about £20, and the stock could realise £50. During the past two years he had paid something like £856 to his creditors, and had received about £1,530 during that time. The balance would have been paid in wages and other expenses. The failure was attributed to lack of capital, depression in trade, bad debts, and depreciation of stock. The case was formally adjourned for the signing of notes.

HENRY HALLIFIELD OXLEY (otherwise Oliver Huxley), consulting engineer, 22, Uxbridge Road, Hanwell, late 120, Coldershaw Road, Ealing.—The first meeting of the creditors of the above was held on Monday, at the offices of the Official Receiver, 14, Bedford Row, W.C., Mr. Cecil Mercer presiding. According to the statement of affairs the gross liabilities amounted to £1,424, all of which were expected to rank, while the assets were valued at £117, or a deficiency of £1,307. The debtor attributed his failure to want of employment and losses over attempted flotations of companies. The deficiency account showed that the debtor had lost £1,411 through bad debts, while he had incurred liabilities of £550 on behalf of a company. The receiving order was made on the petition of a creditor, the act of bankruptcy alleged being the debtor's failure to comply with the requirements of a bankruptcy notice. The debtor, aged 29, was appointed managing director of a company in January of the present year, and filled that position up to June 24th last. He was now acting as manager of the British and Foreign Investments Corporation, Ltd., at a salary of £500 per annum. Between November, 1910, and January last, he had earned commission by introducing capital to various concerns, and he had tried to float the Electrical Power Users' Association, Ltd. He was not successful, and followed that up with the Imperial Crown Insurance Co., Ltd., which was not successful as far as he was concerned. He lost about £1,000 in the flotation of these two companies. A solicitor who appeared for the debtor asked for the meeting to be adjourned, as it was proposed to bring in a scheme with the object of paying the creditors a cash composition of 7s. 6d. in the £. The money necessary for the payment of the composition would be found by friends. In addition, three of the creditors would release their debts. The Chairman pointed out that it would have to be an absolute release, and there must be nothing underhanded about it. The solicitor said he understood that and sufficient money would be lodged in cash to pay 7s. 6d. in the £, and the whole of the expenses. In answer to questions, the debtor stated that he had spent about £800 on one company. The Chairman remarked that at the date of the receiving order several creditors had obtained judgment, and executions had been levied. The debtor had himself admitted that he had been frequently sued during the last four years. Asked regarding his losses on the two companies, he said that one company was the development of another. The household furniture belonged to his wife. Some of it was given her by her father, and the rest she purchased with her own money. She had means of her own, as her father made her an allowance. Last year that allowance came to more than £1,000. Acting on his recommendation, his wife put £700 in a company, and that money was lost, but certain proceedings were pending. The Chairman remarked that it appeared to be a very foolish investment, and it would have been better had the money been put into the bank. The Chairman then asked what the British and Foreign Investments Corporation did, and inquired whether it was a company which lent or spent money. The debtor replied that it did both, but it dealt chiefly with investments. The Chairman: It invests other people's money does it? The Debtor: Yes. Replying to further questions, the debtor said he did not think the fact of a receiving order being made against him would cause him to lose his position with the Corporation. The Chairman said that the Court might make an order for a portion of the salary to be set aside, but if the composition was paid that question would not arise. The meeting was adjourned to enable the offer to be formulated.

At the Court House, Half Acre, Brentford, on Tuesday, the debtor appeared before Mr. Registrar Ruston for his public examination.

Answering the Deputy Official Receiver, the debtor said that for about 15 months he was employed in Sheffield teaching engineering at a salary and commission. He then took the name of Oliver Huxley, in the hope that the name of Huxley would produce more pupils than he otherwise would get. In January, 1912, having a number of influential friends, he introduced certain companies, in the flotation of which he had expended about £800, most of which belonged to his wife. He never received any salary or expenses in regard to the Electrical Power Users' Association, nor the Imperial Crown Insurance Co., but as managing director of the British and Foreign Investments Corporation he obtained a salary of £500 a year. He was not now managing director of that Association, but was manager at that salary; he retired from the managing directorship automatically, but he expected to be reinstated. He had agreed to take up 100 £1 preference shares in that company, and 1,000 1s. deferred shares, but they had not been paid for at the present time, although he had received the letter of allotment. In connection with the other two companies, more than the £800 he had mentioned had been lost, but that was approximately the amount lost by himself and his wife; the creditors had also lost their money in that way. To find the total loss it would be necessary to add the amounts claimed by the biggest creditors mentioned in his statement of affairs, and there were also several others.

The Deputy Official Receiver: Do you think you were justified in in incurring these liabilities?—I had four good directors who promised to support me, but who did not. Proceeding, he explained that he had attributed his failure partly to unemployment, because when he found the two companies were failures, he spent some time in looking for a berth. He was embarrassed about four years ago, but it was not until the Official Receiver pointed it out on the previous day that he recognised that he must have been insolvent at that time.

You have been sued several times during the last six months?—Yes.

And executions have been levied against your goods?—Yes.

As far back as May 29th, 1909, Messrs. Waring & Gillow obtained a judgment and costs against you, and on June 2nd served you with a bankruptcy notice?—Yes.

That notice was served out of the Manchester Court?—I think that is so.

Where were you living at that time?—In Manchester.

What did you do when you received that bankruptcy notice?—I went around and saw them, and told them I would do what I could in the matter.

Then did you leave Manchester?—Shortly after that.

What became of the bankruptcy notice?—I do not know.

At all events a petition was not served upon you subsequently?—No, Sir.

Mr. Stone has obtained judgment against you?—That is right.

For £65 1s. 6d.?—Yes.

Did you defend the action brought against you by Mr. Stone?—No, Sir.

Are you quite certain?—Yes.

Judgment went against you by default?—Yes.

Was judgment obtained against you and Sir Paynton Piggot?—Yes.

Was he a director of your company?—No, but he was connected with it.

Application was made afterwards to set aside the judgment against Sir Paynton Piggot?—Yes.

Mr. Anderson has obtained judgment against you, has he not?—Yes. Debtor stated that that was in respect of £250 money lent for the requirements in connection with the flotation of a company. Mr. Anderson filed a bankruptcy notice against him in the High Court a long time before Christmas, but did not file a petition. Mr. George Stone had filed a petition against him in the High Court, which was pending against him at the time of this receiving order. When he heard of the receiving order, he did not proceed further with it.

So that, to put the matter shortly, you borrowed a very considerable amount of money in connection with the flotation of these companies, and you have been continually sued for some years?—No, not for some years, but this year, and particularly during the last six months.

And in 1909 by Waring & Gillow?—Yes. Proceeding, he said that, in his statement of affairs, he returned no furniture, as that was claimed by his wife; some she had obtained by purchase, some by gift and some by hire. His wife had an allowance from her father, but that amount had been considerably exceeded during the past year.

Did you hire furniture from John Harrop, Ltd., of Manchester?—No. I had some furniture years ago, but that was seized for rent.

Messrs. Harrop, Ltd., hired certain furniture to you?—They hired it to me four years ago, but it was seized.

These agreements of September 8th and September 12th, 1906, were entered into by you?—Yes.

What became of the furniture?—It was seized for rent, and they did not object.

Messrs. Waring & Gillow obtained judgment against you in 1909 for furniture supplied in 1908?—That was seized at the time Harrop's was. I left it behind and never saw it any more.

Where was that?—At Chorlton-cum-Hardy, near Manchester.

Did you leave it behind and never inquire about it?—There was the bankruptcy notice when I came away.

Whose was that?—Messrs. Waring & Gillows.

You are quite certain that a receiving order was not made?—Yes, quite sure, because I saw them within a very few weeks afterwards: I did not leave Manchester right away. I remained there at another address for some months, and saw them two or three times, but no receiving order was made.

Did you take any steps to ascertain anything about it?—I did when Harrop's kicked up a row about it.

I am talking of Messrs. Waring & Gillows?—Apparently it was seized in execution.

They say you still owe the amount of judgment with costs?—I do not know, I think I got some of it back, but at the moment I really do not know what was the end of the matter.

Messrs. Waring & Gillow state:—"We obtained judgment against this debtor on May 28th, 1909, but the debtor fled and we were unable to find him." You cannot assist me further? Are you quite sure that you have not any furniture belonging to you in your possession?—Quite. The officers of this Court have exhausted that matter two or three times recently.

Do you remember writing on August 30th to Messrs. Turner and Osman speaking of making some arrangement? You say: "I am married with a good house of furniture and effects, and hold a good permanent berth"?—It was not my furniture; that was a misstatement.

It was fair to assume that you had a good house of furniture at that time?—I daresay I could have got my wife to be security for me.

Did you discuss it with your wife?—Yes.

Did she say she would be willing to help you?—She did not; she said she would rather find the money herself.

Answering further questions, the debtor said he borrowed small sums of money from his wife in connection with the flotation of companies and certain debts. The British and Foreign Investments Corporation owed him about £100, which would be paid. A book debt of £1,500, put down to the Electrical Power Users' Association, Ltd., was in connection with the preliminary expenses of flotation; he had never received any salary or any return of money expended; that debt was bad, because he did not think that concern had got the capital. He was prepared to make an offer of 7s. 6d. in the £, and his creditors adjourned their meeting of the previous day (Monday) until August 12th, to enable him to make a proposal.

The Deputy Official Receiver: Who is to guarantee payment?

Debtor's Solicitor: It will be paid into the hands of the Official Receiver.

Debtor: The money will be paid by someone, not myself.

After a few further questions the examination was adjourned.

JOHN WILLIAM GARSDEN (trading as J. W. Garsden & Co.), electrical engineer, 24, Preston New Road, Blackburn.—The first meeting of creditors herein was held on July 18th, at the Official Receiver's offices, Byrom Street, Manchester. Mr. Chas. H. Plant, the Official Receiver for the Preston and Blackburn districts, presided. The statement of affairs disclosed liabilities amounting to £5,036, and assets estimated to produce £925 net, leaving a deficiency of £4,111. The debtor attributed his failure to being made jointly and severally liable for a sum of £1,100 in connection with a previous partnership dissolved at the end of 1909, and for which he never considered himself liable. The chairman explained that when he came into possession of the estate there were a number of contracts which required to be completed, and he considered it advisable to carry on the business and work out the contracts. For that purpose a special manager was appointed and the business continued. It was hoped, he added, that the business might be sold as a going concern. Debtor having no offer to make the meeting appointed Mr. Joseph Smith, I.A., of Blackburn, as trustee with a committee of inspection. The debtor first commenced business about nine years ago with a Mr. Wesley Sutton, and a Mr. Samuel Lord, trading as the Howe Electrical Engineering Co. Debtor put £700 into the business, money given him by his father. Sutton and Lord were previously carrying on the business, and the £700 purchased a third share. The business was not successful, and at the end of 1909 it was turned into a limited company, Sutton going out and a Mr. Sington coming in and bringing in further capital to the extent of £1,000. The limited company traded in the same name, but the business was not successful, and in February of last year it was wound up, no dividend being paid. The company had a branch business at Blackburn, and this the debtor took over in February, 1911, paying £155 for the goodwill and stock. This money he got from the bank, his father guaranteeing his account to the extent of £200, afterwards increased to £300. This business at Blackburn has, according to the debtor, been a paying one, and he made about £3 a week net profit out of it. He would have continued to make it pay, but a judgment was obtained against him for £1,118 and costs in June last, in connection with money which had been brought in or advanced to the partnership of which he was formerly a member. Debtor stated that he had never considered himself liable for this money, and that it was lent to and brought in by one of the partners personally. Judgment, however, was obtained against the debtor, and he was compelled to file his petition. In March last a balance-sheet was prepared, showing that he was solvent save as to the moneys advanced by his father and brother-in-law. The amount due to the father is £2,156, part of that being for rent.

Trade Announcements. — THE LORD-HOWE ELECTRICAL ENGINEEEING CO., LTD., of 18, James Street, Liverpool, who have had the agency for the National Telewriter Co., Ltd., for Liverpool, for some time, have been appointed agents for all Lancashire and Cheshire, and have opened a branch office at 5, Cathedral Yard, Manchester. Telephone, "No. 3300 City."

MESSRS. JAEGER BROS., 18, Christopher Street, Finsbury Square, London, E.C., have been appointed sole agents for the British Isles for the Swiss Cable Works, Ltd., and they are accumulating large stocks in London for immediate delivery.

MESSRS. KRUPKA & JACOBY have purchased in Westminster a very large property, consisting of offices, warehouse and factory, built on up-to-date lines and fitted with all modern improvements, where they will carry much larger stocks enabling them to deal more expeditiously with orders.

The business of Mr. E. J. West, electrical engineer, 47A, Market Street, Bacup, has been taken over by the executors of J. BIRTWISTLE, of Waterfoot.

Liquidations.—BECK FLAME LAMP, LTD.—Creditors must send particulars of their debts, &c., to Messrs. H. J. Page and G. E. Corfield, 21, Ironmonger Lane, E.C., the joint liquidators, by August 26th.

LIVERPOOL INTERNATIONAL EXHIBITION (1912) CO., LTD.—A meeting is called for August 27th at 1, Vernon House, Bloomsbury Square, London, W.C., to hear an account of the winding up.

VAUGHAN ENGINEERING INSTALLATIONS, LTD.—A meeting is called for August 29th, at 60, Oakley Street, S.E., to hear an account of the winding up from the liquidator, Mr. W. Purchas.

Meter Approved.—The B. of T. has approved of the Adnil single-phase two-wire A.C. watthour meter, type B E, deposited by the ADNIL ELECTRIC CO., LTD., in August, 1909.

Lamps for Lagos.—We understand that SIEMENS BROS. DYNAMO WORKS, LTD., have just supplied about 400 tantalum traction lamps for use on the new pontoon dock for Lagos Harbour, where they will, of course, be used in positions where vibration is very severe. These were supplied through Messrs. Swan Hunter and Wigham Richardson, Ltd., of Newcastle.

For Sale.—The Wallasey Corporation electricity department has for disposal about 200 Schallenberger ampere-hour meters. See our advertisement pages to-day.

Spain.—The following information is from the report by H.M. Consul at Bilbao (Lord H. Hervey) on the trade of that district in 1911, which will shortly be issued:—The total imports of electrical machinery into Bilbao during 1911 amounted to 271 tons as compared with 284 tons in 1910. Of this amount, only 37 tons came from the United Kingdom. It is exceedingly difficult for British firms to compete in the Bilbao market with other foreign makers, who, with good showrooms carrying heavy stocks, and with complete staffs of engineers and travellers, neglect no opportunities of monopolising the trade.—*Board of Trade Journal.*

LIGHTING and POWER NOTES.

Acton.—At last week's meeting of the U.D.C. Public Health Committee, the deputy surveyor, Mr. C. J. Yoratt, presented a report showing the cost of lighting the isolation hospital and dust destructor by electricity with the Council's own installation, as compared with electricity as now supplied by the company, or gas supplied by the Brentford Gas Co. The figures showed that at present the cost of lighting the hospital (electricity) and dust destructor (gas) amounts to £170. If the hospital were lighted by gas, the cost was estimated at £165; and with generating plant installed at the dust destructor for lighting both buildings, the cost worked out at £161 per annum. The prime cost of the installation would be £1,500 (£121 per annum repayments), and the other items amounted to £40.—In reply to Councillor Poulton, the Surveyor said the gas company would not consent to carcase the building with pipes, and consequently £75 had been allowed for

that.—Councillor Poulton: If a private firm wished it, they would do it.—The Surveyor: The gas company were pressed on the matter, but refused to consent. The clerk pointed out that the estimated saving of £8 a year was based on the present rate of electricity paid to the company—5d. per unit. The price was, he thought, likely to go down. It was decided to adjourn further consideration of the report for three months, and that in the meantime the wiring at the hospital be tested.

Argentina.—The Municipality of Trelew (Chubut) is negotiating with a Buenos Ayres firm for the installation of electric light. The municipality of Laboulaye (Cordoba) has signed a contract for the lighting of the whole town by electricity. The Nogoyá Municipality have under consideration a proposal for installing electric light, made to them by Mr. M. Grut. Mr. C. Ella has applied for a concession for installing a telephone exchange. The president of the Compania Italo-Argentina de Electricidad, Engineer J. Carosio, accompanied by his legal adviser, has paid a visit to the Mayor of the City of Buenos Ayres, advising him of the formation of the company with Argentine, Italian, French, Belgian and German capital. He stated that it was the intention of the company to establish power houses in the Federal Capital, and that in the course of a few days a scheme would be presented to the authorities.—*Review of the River Plate.*

Barrow-in-Furness.—Mr. T. C. Ekin held a L.G.B. inquiry on Tuesday, into the application of the Corporation to borrow £22,000 for the purposes of their electrical undertaking. Mr. H. R. Burnett, borough electrical engineer, pointed out that there was a steadily increasing demand for electricity for lighting and power. The Corporation was also desirous of providing for eventualities in connection with two or three large works in the borough. There was no opposition to the application.

Barrowford.—At a Council meeting on July 18th, a letter from Newton-in-Makerfield Council relative to the refusal of the Board of Trade to grant an electric light order to that Council having been read, it was resolved—"That the clerk communicate with the member for the Clitheroe Division requesting him to support Lord Wolmer, M.P., in his endeavour to get the Board of Trade to reconsider the application or to state definitely what will satisfy the Board's requirements before they consent to grant the order." Rishton and other East Lancashire Councils have taken similar action.

Batley.—Some time ago the Council authorised an expenditure of £16,000 on a scheme for the extension and remodelling of the electricity works. Subsequently, however, negotiations were entered into with a private power company in regard to a supply of current in bulk to the Corporation. After considering the question for some time the Electricity Committee has come to the conclusion that the best interests of the town will be served by extending the present works, at an estimated cost of £17,000—£18,000, and the sub-Committee has been authorised to institute inquiries with a view to the adoption of the best possible scheme.

Belfast.—The report of Mr. Bloxam, electrical engineer to the Corporation, on the proposed extension of the plant, &c., has been received, together with that of Mr. S. L. Pearce. Mr. Bloxam gives the following estimate of the cost of the plant for a new station: Two turbo-generators, with spare armature, condensing plant, air and circulating pumps, motors, valves, &c., £14,500; four boilers, superheaters, mechanical stokers, economisers, motors, &c., £13,689; pipes, pumps, tanks, &c., £5,100; switchgear, £1,180; coal-handling machinery, £6,200; engine room travelling crane, £800; three sub-stations, motor-generators, £10,410; switchgear, £2,370; cables, E.H.T. feeders and L.T. distributors, laid complete with boxes, £30,720; with 5 per cent. added for contingencies. Mr. Bloxam's report anticipates a demand for 15,600 H.P. in 1920, plus 10,000 H.P. which may be secured from large firms which at present generate their own current. The present plant can be increased only to 11,400 H.P. Mr. Pearce's report deals with proposed extensions to the existing station as follows: Six Babcock and Wilcox boilers with economisers and superheaters, £9,000; three 1,500-KW. turbo-generators with condensing plant, £14,000; extra-high-tension and low-tension switchgear and cabling, £3,000; housing for same, £500; three cooling towers, motors, foundations, £3,000; pipework, £500; removing old plant and preparing foundations for new, £1,500; with 5 per cent. for contingencies. No discussion on these proposals has yet taken place.

Bexhill.—The assessment of the electric light works is to be appealed against. The Assessment Committee recently raised the amount from £440 to £1,600.

Bideford.—Mr. J. A. W. Purves, of Exeter, has informed the T.C. that he intends applying for a prov. order for E.L. The Council has deferred consideration of the matter.

Bolton.—Important developments are contemplated in connection with the Corporation electricity undertaking, instructions having been given to the engineer to prepare plans and estimates for a proposed new generating station at Back-o'-the-Bank.

Bradford-on-Avon.—Messrs. J. and W. Purves having informed the U.D.C. that they are applying for a prov. order for E.L., the Council has decided to obtain full information of the scheme, as it is desirous that the town should have an electrical supply.

Burford.—The P.C. has invited the E.L. company and the gas company to tender for public lighting for the district.

Bury.—The T.C. has decided to apply to the B. of T. for permission to use overhead wires for the supply of current to the new works of Ashworth and Parkers, Woodhill Road.

Chalfont St. Peter.—Mr. R. E. H. Fisher, of Lincoln's Inn, W.C., has given notice to the Amersham R.D.C. of his intention to apply for a prov. order for electric lighting in part of the parish. The Council has resolved to offer no opposition.

Chester.—The accounts of the electricity department (Mr. S. E. Britton, engineer) for the year ending March 25th, show an output of over 2,000,000 units sold, at an average cost of 0·946d. per unit; the works cost was 0·678d. The total income was £23,023, and the expenditure £11,499, leaving a gross profit of £11,524; interest and sinking fund absorbed £7,332. £1,441 was transferred to the rates, and £2,810 was put to reserve. During the year £3,575 out of the reserve fund was expended on renewals, and the fund now stands at £12,429, as against £13,207 last year.

Chile.—A 10 years' concession has been granted to Don Arturo Vicuna for the erection of a central generating station, to supply electric light for the town of Bulnes. The installation must be completed in 12 months.—*Board of Trade Journal.*

Christchurch (Hants).—It has been decided to obtain estimates for installing electric light throughout the workhouse.

Continental Notes. — BELGIUM. — The Belgian State Railway authorities have decided to put down electric lighting installations at the railway stations at Louvain and Namur, and at the railway workshops at Louvain

HUNGARY.—The establishment of central electric lighting stations in the Hungarian towns of Antalfaloa and Szelistze has lately been decided upon.

FRANCE.—A central electric lighting station is to be established in the mining town of Bethune.

A scheme to light the towns of Montceaux, Marmagne, Saint Symphorien, Broye, Mesvres and Etang, Department of Saône-et-Loire, by electricity has been submitted by a society just formed at the first-named place.—*La Lumière Electrique.*

GERMANY.—The parish church on the Klosterstrasse, in Berlin, with its famous 200-year old bells, is the first church in Berlin to be fitted with electric ringing appliances. This ingenious apparatus is the invention of a Cologne firm, and has already been installed in some 30 churches in the Rheinland and Westphalia, as also in the Cathedral at Limburg, and in the Marien-Kirche at Landaupfalz, where bells of a total weight of 11,500 kg. are set in motion. The special advantage of the apparatus is that it gives a two-sided pull on the bells, whereby an absolutely precise and uniform stroke of the hammer is made, without shake or shocks. The current consumption is small.

The great increase in consumption of current has induced the T.C. of Düsseldorf to construct a second power house. The new establishment will be of ample structural proportions, and its output capacity will be 42,000 KW., equal to 60,000 H.P. The station will be steam driven, having as first equipment two 8,500-H.P. turbines, increased later by three of 10,000 KW. each. The steam plant of the old station will also be modernised, its present plant being replaced by modern turbines of a total capacity of 20,000 KW.

A society, composed of capitalists and large manufacturers, has been formed at Düsseldorf, whose object is to open up and develop the mountainous district of the Eifel, by the establishment of electric stations on its numerous watercourses, and the creation of an iron industry. The Government has lent its assistance to the scheme, and the provincial governor has accepted the presidency of the group.

An electrical exhibition with the object of popularising the use of electrical apparatus in the house, in trades and in husbandry, is to be held at Nuremberg from September 1st to 30th.

RUSSIA.—The municipal authorities at Kronstadt have decided to light the public streets of the town with electricity.

TURKEY.—The formation of the Constantinople Electric Society, to supply the Turkish capital with light and power, has already been announced. The works of construction are now in full swing. The generating station, of a capacity of 15,000 KW. is in course of construction at the mouth of the river Silighter, where it empties into the Golden Horn. The works are being carried out by two companies. The Gesellschaft Ganz, of Budapesth, are supplying the machinery equipment, electrical and mechanical; and the Société Générale d'Enterprises of Paris, are constructing the power-house, canals, roads, offices and sub-stations. It also supplies and installs the distributing network. The buildings are on foundations of armoured concrete 1 metre thick, the buildings themselves consisting of a metal framework with walls of iron and brick. Water for the boilers and for condensation is drawn from the river Silighter and conducted to the station by a canal 150 metres long of armoured cement. Waste water is discharged into the Golden Horn by means of another canal of armoured cement. For the landing of the material and fuel a quay has been built on piles. The network, underground throughout, has a total extent of 350 km. The cables are being made by the Canalisation Electrique Co., at their works at St. Maurice and Dijon, and will be laid so soon as they are delivered. The Société Générale d'Enterprises has built a brick works near the Golden Horn, and equipped it with petrol motors, where the cement and sand bricks are being made for use in the construction of the station, &c. The sand itself is brought from a quarry in Asia, on the shore of the Black Sea, and imported specially for the purpose.—*La Lumière Electrique.*

ITALY.—A Milan company has applied for a concession to utilise the water-power of the River Plane at Mel, in the Prefecture of

Belluno. It is proposed to put down an electricity generating plant of about 6,000 H.P., the current being distributed for lighting and power purposes in the provinces of Vicenzo, Padua and Treviso. The plant is estimated to cost about £200,000.

Erith.—The U.D.C. has received from the L.G.B. sanction to the following loans: £8,000 for mains; £2,070 for transformers and sub-stations; £1,200 for house services; £230 for excess expenditure on house services and sub-stations, and £170 for a coal bunker—a total of £11,670. The L.G.B. declined to sanction a loan of £300 for electric heaters and cookers, which, they considered, should be paid for out of revenue account.

Exeter.—At the last meeting of the Electricity Committee, a letter from the city electrical engineer was read, in which he suggested that, in view of the resignation of the official canvasser, this position should be abolished, and that, instead, a commission of 6d. per point for lighting and 2s. 6d. per H.P. for motors should be offered to wiring contractors for duly signed applications brought in by them. The engineer said that practically all these contractors put in sanitary and water fittings, and therefore had the earliest information as to new premises, &c. It was resolved that these suggestions be adopted.

The Committee has decided that, in future, the charges for energy for power and heating shall range from 2d. to 1d. per unit.

Faversham.—The T.C. has arranged to supply electricity to the new residence being erected in London Road by Capt. O'Brien.

Finchley.—In connection with the scheme for the removal of the centre tramway poles in Great North Road, the Highways Committee of the Council reports that it appears to be an opportune time for the question of improving the lighting to be considered, so that any alterations that the Council may deem necessary may be carried out concurrently with the removal of such poles. The electrical engineer has prepared several schemes, and out of these the Committee thinks that it would be in the best interests of the Council to adopt the one for the erection of 25 arc lamps at a total cost of £1,341. The lamps used would give 3,000 C.P. each and would be fitted with dioptric diffusers. The annual extra cost of this scheme is put at £448. At a meeting of the Council this work was approved of, and the Committee was further authorised to submit a report on the question of improved lighting at Church End. At this meeting the debate on the electric lighting balance-sheet (reported in our issue of June 28th) was resumed. It was stated by the chairman that from the beginning of the undertaking a deficit had been shown in three annual balance-sheets, the others showing a profit. The excess of profit over loss amounted to £1.093, and, in addition, they had repaid £25,000 capital and paid £30,000 interest.

Fishguard.—The Fishguard Development Syndicate, of Essex Street, Strand, have intimated to the Haverfordwest R.D.C. that they intend applying for a prov. order for the supply of electricity within part of the rural district.

Gellygaer.—The U.D.C. has appointed a committee to consider a scheme for lighting the Bedlinog district by gas or electricity. It is suggested that electricity could be produced at a cheap rate by harnessing the river.

Grays.—The County of London Electric Supply Co. has informed the U.D.C. that it intends applying for a prov. order for electric lighting. When the matter came before the Council, the chairman remarked that they did not want the threatened competition, and the clerk was instructed to draw up a report on the matter.

Greenock.—For the 12 months ending June 30th the units sold by the electricity department were as follows:—Private and public lighting, 1,135,153; power, 8,038,531; traction, 1,030,601. This is an increase of 3,000,000 units as compared with the previous year.

Messrs. Fleming Reid & Co. have consented to the terms as to the guarantee for a supply of electricity to their mills for 14 years at £70 per annum, and the engineer has been authorised to lay the necessary high-pressure cable at a cost of £751.

Hendon.—The R.D.C. has decided to oppose the application proposed to be made to the Board of Trade by the Colne Valley Electric Supply Co., Ltd., for a provisional order for supplying electricity within the district.

Hertford.—The Herts. C.C. has decided to have an electric lift installed at the Shire Hall, at an estimated cost of £120.

Heston and Isleworth.—The electricity mains are to be extended for a distance of about 1,700 yards, at an estimated cost of £850.

India.—The work of laying over 60 miles of three-core 6,600-volt cable, for connecting up the new Cossipore power station and Calcutta sub-stations, has, according to the *Indian and Eastern Engineer*, been completed—the jointing by Messrs. W. T. Glover and Co., and the laying by the Calcutta E.S. Corporation. The cable is paper insulated, lead sheathed and wire armoured, and is laid solid in cast-iron troughing. Some 600 drums were shipped by Messrs. Glover to Calcutta. We gather that the Cossipore Works, situated near both river and railway, are equipped with three 3,000-KW. high-pressure and one 800-KW. mixed-pressure turbine sets by the Oerlikon Co., and condensing plant by Messrs. W. H. Allen, Son & Co., who also supplied four 80-B.H.P. vertical-spindle electrically driven centrifugal pumps for supplying circulating water to the condensers. The main switchboard at the power station and all the switchboard work at sub-stations has been carried out by the B.T.-H. Co. Of the existing stations of the Electric Supply Corporation, three—at Alipore, Ultadanga and Howrah—are being converted into sub-stations, and, in addition, there will be new sub-stations at Princep Street, Wellesley Street and Jackson's Lane. At the Princep Street sub-station there are being installed six Bruce-Peebles motor-converters, each set having a capacity of 500 H.P., and the Wellesley Street, Jackson's Lane and Howrah sub-stations are equipped with similar plant, each having three sets.

Kingston.—In his annual report, Mr. J. E. Edgcome states that there was a net loss on the year of only £60 as compared with £1,193 in the previous year. The net loss on the undertaking up to the present has been £15,274.

Kingswood.—The B. of T. have informed the U.D.C. that they propose to revoke the Electric Lighting Order of 1904, as the undertakers have not yet made the deposit of £500, nor have they executed the compulsory works specified in the order.

London.—ST. PANCRAS.—The Electricity Committee of the Borough Council reports having had before it a scheme from the chief electrical engineer, submitting proposals for the extension of the boiler house and boiler plant at the King's Road electricity station at an estimated cost of £35,460. In respect of this proposal, the Finance Committee did not see its way to submit an estimate of cost to the Council for the reason that the scheme presented difficulties. The engineer informed the Committee that it was absolutely necessary either that further boiler plant should be provided at the station without delay, or that some scheme of much larger magnitude should be undertaken in the direction of providing a new generating station with a siding where coal could be obtained and handled more easily and cheaply, and where ample space would be available for extensions. For a number of years past, the generating of electricity in the borough had been carried on under extreme difficulties owing to the absence of sufficient and properly arranged boiler and coal-handling plant, and it was the general opinion that unless steps were taken to regain lost ground, it would be impossible to generate electricity at the Council's existing stations at anything like such low prices as those obtained in other boroughs. It was suggested by the engineer that now that the proposed small extension of the boiler house and plant at the King's Road station had been adjourned, it would be better to go more fully into the possibility of a larger extension on the above lines, with a view of placing the St. Pancras electricity undertaking again to the fore and enabling it to generate and place its electricity on the market at more attractive prices. The Committee thinks, before further considering the subject, that information should be obtained with regard to some of the more modern electricity stations, and for this purpose it has appointed a small sub-committee to consider fully the question of the future generating and supply of electricity, with instructions to visit some modern works to ascertain at first hand the advantage to be obtained by a bolder handling of the problem under discussion. Mains are to be extended in various streets at a cost of £640.

LEWISHAM.—The B.G. has decided to have the electric light installed at the infirmary laundry.

STOKE NEWINGTON.—At the last meeting of the B.C., Dr. White said that he hoped before the dissolution of the Council in November next to bring up some proposals for the reduction of the electric lighting charges from a flat rate of 5d. to, say, 4½d. Some concessions, too, could be made to users of power.

ISLINGTON.—Mains are to be extended in various parts of the borough at a cost of £580.

STEPNEY.—The accounts of the electricity supply department for the year ended March 31st show that the year has been the most satisfactory yet experienced. The sales of energy have increased by over 31 per cent., to 11,972,955 units; the net surplus, after paying capital charges, is £12,757, as against £1,769 last year, in spite of a reduction in price representing £5,400, and an increase in capital charges of £4,500. The total amount available for allocation is £14,854, of which £673 will be allotted to capital expenditure, £1,426 written off capital account, £250 reserved for bad debts, £10,251 placed to renewals of machinery, and £2,254 carried forward. The statement embodies the first complete year's working of the turbine generating station at Limehouse, under condensing conditions, and the load has been transferred almost wholly from the Whitechapel station. The effect of the change, combined with a 100 per cent. increase in output during the past two years, has been an actual reduction in the cost of coal (partly due also to delivery by barge instead of carting) from £12,290 to £11,995, and of the cost of coal per unit generated from 0·436d. to 0·210d.

The works cost per unit sold has dropped from 0·86d. in 1909-10 to 0·56d. for the past year, and Mr. Tapper points out that Stepney's works cost per unit sold is now the lowest yet attained in the County of London. The load has increased so rapidly that the margin of plant capacity has already been absorbed, but, thanks to the provision of a 1,000-KW. stand-by supply from Poplar, extensions will not be required for the coming winter. The power load connected now represents nearly 11,500 H.P., and the total connections amount to the equivalent of 536,068 30-watt lamps.

Mansfield.—At a meeting of the T.C. on Friday last, the Electricity Committee reported a gross profit for the year of £5,342, as compared with £4,343 last year. After payment of interest on loans (£2,241) and contributions to sinking fund (£1,710) there

remained a net profit of £1,391, against £466 last year. The number of consumers was 682, compared with 590 customers at March, 1911. The total number of units sold was 1,127,139, compared with 938,330 ; 562,221 units were for general supply, and the balance for the tramways. The number of private motors connected was 127, of 446 H.P., compared with 99 and 306 H.P. The Committee was fortunate in anticipating the miners' strike, and the provision made was adequate to enable full service to be maintained during the whole period. The distribution system had been extended in various directions, particularly in the rapidly-growing eastern side of the town. The output of the works, by far the largest since they were opened, indicated that the increase in customers had neutralised the effect of the metallic-filament lamps, while the tramway extension had brought up the consumption on this account to a figure reasonably compatible with the capacity of the plant and mains which had been specially provided. The increase in the output, totalling roundly 200,000 units, had been produced with but a very small increase in expenditure.

Councillor J. H. Collins, in moving the adoption of the report, remarked that the net profit of £1,400 was the highest that had been made up to the present. It had been decided to establish a reserve fund, towards which £790 would be paid. The Committee would in a short time supply the township of Woodhouse with electricity. There would not be a great deal of profit attached to this extension, but he was convinced that there would be no loss.

The town clerk reported that the L.G.B. had sanctioned the Corporation's application to borrow £4,000 in connection with the work of electrical extension.

Middlesbrough.—The Corporation Electricity Committee has adopted the recommendation of the electrical engineer (Mr. H. M. Taylor) that electric flat-irons should be lent, with free wiring, to customers prepared to use them on lighting rates.

Norwich.—The revenue of the electricity undertaking for the past year was £45,941, while the working expenses were £23,530, leaving a rough profit of £22,411. The charges for interest and sinking fund were £15,733, and the balance carried to appropriation account was £6,678, increasing the amount at the credit of that account to £16,151. The cost of production per unit during the year was 5 per cent. less than the corresponding cost for 1910-11. It is expected that the increase in the price of coal will affect the net revenue for the 1912-13 year to the extent of at least £1,500, but it is not proposed to increase the price of energy. The renewal of old mains laid in the early stages of the undertaking has been proceeded with, and 6 miles 600 yd. of new mains have been laid.

Oldham.—On the 17th inst., Mr. T. C. Ekin held a L.G.B. inquiry into an application of the Corporation for sanction to borrow £22,983 for the purposes of the electricity undertaking. Mr. Newington, the borough electrical engineer, pointed out that the extension of the plant was necessary, owing to the demand having been increased by the coal strike. The inspector said he had found that throughout the country the coal strike had been a great blessing to electricity. It was subsequently agreed to add £3,000 to the amount for which sanction is being sought.

Ramsbottom.—The Lancashire Electric Power Co. are extending the electric mains from Woodhey, Holcombe Brook into Summerseat. Primarily, this is to provide motive power for pumping in connection with the extension of the sewage works for the D.C. It is also understood that electric lighting will be installed in several premises, including the new Summerseat Liberal Club.

Rawtenstall.—With reference to the scheme for the lighting of the main roads by electricity, a Special Sub-Committee, after going over the roads, has given the borough electrical and tramways engineer instructions with regard to the positions of the proposed 90 lamps between Queen's Square, Rawtenstall, and the borough boundary at the Thrutch, Waterfoot.

Redruth.—The U.D.C. has granted permission for the Cornwall Electric Power Co. to erect an overhead line for the transmission of current from the power station to Tresavean Mine.

Rishton.—At a meeting of the T.C. on July 18th, a notice was read from Mr. J. W. Speight, consulting electrician of St. Annes-on-Sea, stating that he intended on behalf of the Rishton Electric Supply Co., Ltd., to apply to the B. of T. for a prov. order to authorise the supply of electricity within the district.

Rugely.—A meeting of ratepayers has been held for the purpose of considering the scheme for the lighting of the town by electricity. It was moved that the scheme put forward by Mr. Balbiani should be adopted, but, after some discussion, the motion was defeated by an overwhelming majority.

Sidmouth.—The U.D.C. has sealed a notice to the Gas and Electricity Co. of the Council's intention to purchase the undertaking.

South Africa.—The Imperial Trade Correspondent at Durban (Mr. A. D. C. Agnew) reports that the Pietermaritzburg Corporation is applying for powers to borrow £42,000 for additions to electric lighting plant, and that the Ladysmith Corporation is making application for £22,000 for the same purpose.

Sunderland.—The report of Mr. A. S. Blackman for the year ending March 31st states that 12,373,429 units were sold, an increase of 21 per cent. ; the works cost was reduced from 0·525 to 0·475d., and the load factor rose to 24·59 per cent. Fuel cost was 0·17d., and total cost 1·17d. per unit. Motors connected amounted to 3,178 H.P., and the power units sold were 8¾ millions, as well as 1¾ millions for traction. The total income amounted to £63,134, and expenditure to £28,586, leaving a gross profit, with £112 brought forward from last year, of £34,660 ; after deducting capital charges, £1,126 was paid to the rates in repayment of an amount transferred in 1908-9, and £2,832 was carried to the depreciation and renewals fund. The outstanding debt amounts to £297,641, and the depreciation and renewals fund (from which £575 was drawn during the year) stands at £2,257. The maximum demand was 5,740 KW.

At the T.C. meeting on 16th inst., Alderman Bruce moved the adoption of the Electricity Committee's report. Mr. G. S. Lawson criticised the preferential tariff allowed to tradesmen who used electric light only, and said that in the event of a breakdown at the generating station, the shopkeepers would be without a light. As to the sales department, it was not right for the Corporation to carry on the business, which at any time might plunge the ratepayers into great legal expense. He also drew attention to the fact that in the finance report, the shares of Messrs. Laing, the shipbuilding firm, valued at £2,477, were carried forward at their full value, and considering the state of the company's affairs, he thought they should not be put down at more than 5s. per share. Mr. F. Nicholson said that £2,257 had been placed to reserve, and would cover any difference there might be in the value of Messrs. Laing's shares. After a short discussion, the report, as submitted, was approved and carried.

Truro.—The T.C. has received notice of the intention of Messrs. J. & W. Purves, the Truro Gas Co., and Messrs. W. & T. Pressland, of London (on behalf of a prospective company) to apply for prov. orders for electric lighting.

West Ham.—The report of Mr. H. H. Couzens on the working of the electricity department for the year ended March 31st shows that the output was 24,147,890 units, an increase of 1½ millions ; the total connections amount to 15,637 KW., as compared with 13,334 last year, the increase being mainly in power connections. The average price obtained increased, almost for the first time, from 0·93d. to 0·96d. per unit, the price obtained for power alone rising from 0·6d. to 0·63d. Strikes increased the cost of fuel by over £2,500, and higher rates and wages, as well as special breakdowns, raised the cost of labour by £1,000. The sales department shows an increase in the gross profit of £450, although the capital charges are heavy on account of the short period of the loan (three years), the capital engaged being £7,000. The surplus on the year's working of the whole undertaking amounts to £3,389, as against £3,996 last year, in spite of the special extras amounting to £4,820. A 3,000-KW. turbo-alternator has been installed, bringing the total capacity of the generating plant up to 14,100 KW. The current year will be burdened with the balance of the results of the miners' strike and the Thames dock strike, and the supply of electricity to the Port of London Authority has been delayed for the same reason.

The maximum demand on the station was 10,826 K.V.A. (9,341 KW.) ; motors connected number 1,338, aggregating 13,928 H.P. Total units generated were 30½ millions, of which 2½ millions were sold for private lighting, ¾ million for public lighting, 15 millions for power and heating, and 5½ millions for traction. The load factor was 29·5 per cent. The capital expenditure amounted to £531,951, of which £368,932 was outstanding. The total revenue was £95,548, and the gross profit £38,122. The works cost was 0·571d. per unit, and total cost 0·917d.

Willesden.—According to the accounts of the electricity undertaking for the year ended March 31st last, there was an expenditure of £17,412, as against an income of £31,296, leaving a gross profit of £13,883. After allowing for interest on loans (£3,919), instalments of loans (£4,664), and depreciation (£115), and adding £115 on the income for interest on bank balances, there remains a net profit on the year's working of £5,339. The cost of distribution during the year amounted to £1,783, or 1·52d. per unit, while £11,916, or 1·016d. per unit, was expended in the purchase of energy in bulk. There was an income of £3,042 from public street lighting, and £26,454 from the sale of energy. The output during the year amounted to 2,815,129 units (2,459,200 for private supply, and 355,929 for public lighting), as against 2,638,766 units during 1911. The total working costs amounted to £17,412, or 1·485d. per unit, as against £18,303, or 1·665d. in the previous year. The maximum supply demanded during the year amounted to 1,502 KW., as against 1,509. There was total expenditure on capital account to March 31st of £203,770 (£4,731 of which was expended during the year under review), compared with £199,039 last year. An income of £1,058 was realised from meter rents.

Yeovil.—Messrs. J. & W. Purves have informed the T.C. that they intend applying for a prov. order for electric lighting. The Council has decided to take no action in the matter. A previous application by the same firm was opposed by the Corporation.

TRAMWAY and RAILWAY NOTES.

Bath.—Meters are being fitted on the tramcars running in the city.

Bingley.—The D.C.'s surveyor has been instructed to prepare estimates of the cost of the various improvements entailed in the proposed tramway from Bingley through Nab Wood. A

meeting of the Council is to be held to consider the position, and to decide whether it would be advisable to proceed with the work.

Birmingham.—Arrangements have been made for securing the necessary materials for the new Hagley Road tramway. It is expected that the work of constructing the track will be commenced in October.

Bradford.—The question of tramway accommodation has again been brought before the City Council by the tramways manager (Mr. C. J. Spencer), who advocates a scheme of building a large new central depôt at Longlands at a cost of £46,500. An alternative scheme is the rebuilding of the temporary depôts, &c. (costing £22,408), but it is suggested that this would not be so economical. The Committee has decided to recommend to the City Council the suggestion for the establishment of a large central depôt. If the scheme is carried through certain of the present out-district depôts will be retained, whilst others will be dismantled.

Chester.—The accounts of the Corporation tramways for the year ending March 25th show total income £12,820, working expenses £7,952, and gross profit with bank interest £4,963; interest and sinking fund absorbed £3,791, and £1,172 was placed to reserve. The car-mileage was 347,904, and passengers carried 3,078,564.

Continental Notes.—GERMANY.—A novelty in the matter of electric traction is furnished in the city of Altona, where an electric towing railway service has been established. In a steep street of the city, 600 metres long, with a rise of 15 per cent., where there is a daily traffic of some 200 vehicles with loads of from 5 to 10 tons, electric locomotives worked by direct current at 550 volts from overhead lines are used to tow two or three wagons at a time up the hill. The horses remain with the wagons, the towing coupling being simply attached and dropped when the top of the hill is reached; the locomotives descend the hill on the return journey without current. The equipment is supplied by the Gesellschaft für Gleisbahnen (Max. Schiemann and Co.) of Wurzen, I.S. The charge for the towing is from 0·5 to 2 marks for loads of from 2·5 to 7·5 tons, and a discount is allowed for several wagons of 20 per cent.—*E.T.Z.*

A beginning has been made with the building of the electric railway from Opladen to Burscheid, which step will hasten the construction of the section Burscheid-Hilgen and Wemmelskirchen; as also that to Witzhelden and Solingen. With the completion of these several lines, Solingen, the Sheffield district of Germany, will be fully catered for in the matter of electric railway facilities.—*Elek. Nachrichten.*

FRANCE.—The company owning the Nord-Sud underground electric railway in Paris, the first section of which was opened at the beginning of November, 1910, had 7·4 miles in operation by the end of 1911. The gross receipts last year amounted to £285,000. After defraying working expenses and paying £16,000 as the share of the City of Paris, the accounts show net profits and balance forward of £81,000, which sum allows of the distribution of a dividend of 2½ per cent. on the ordinary share capital of £3,000,000. The proportion of working expenses to gross receipts was 52 per cent., this comparing with 42 per cent. in the case of the older Metropolitan railway. When fully completed, the Nord-Sud railway will have a total length of 12·4 miles and the total outlay will presumably be £6,400,000. A loan of £1,400,000 is in circulation, and the directors are already authorised to raise a further loan of £1,400,000, whilst the balance of £600,000 is expected to be obtained with the assistance of the banks associated with the company.

The Midi of France Railway Co. is reported to be studying the adoption of electric traction on the railway between Toulouse and Bayonne.

In the Department of the Lot, a Government inquiry has just been held regarding a scheme to build six separate lines of electric tramway. A line 15-km. long has also been officially inspected to link up Ervy and Chaource, in the Department of the Aube.—*La Lumière Electrique.*

HUNGARY.—Losonez is to be provided with an electric tramway system, a concession having been secured for this purpose by the Engineer Desider Frank, who intends to form a company for the realisation of the scheme.—*Elek. und Maschinenbau.*

AUSTRIA.—A preliminary concession has lately been granted in respect of a projected narrow-gauge electric railway between Alttersee and Unterack.

ITALY.—The *Gazzetta Ufficiale* (Rome) contains a decree whereby a concession is granted to the communal authorities of Modena for the construction and working of three sections of electric tramway in Modena.—*Board of Trade Journal.*

SWEDEN.—The existing railway between the fashionable seaside resort of Saltsjöbaden and Stockholm is to be electrified, thus bringing it within 25 minutes' ride of the capital instead of one hour. The line is to be worked from the Stockholm municipal power house, three-phase current at 6,000 volts and 25 periodicity being supplied to a centrally situated transformer station, where it will be transformed into direct current at 1,200 volts pressure and distributed by an overhead network. Orders for the rolling stock and the whole electrical equipment have been placed with the Allmänna Svenska Elektriska Aktie-Bolag, of Westeraas. It is expected that the line will be in full working by next summer (1913).—*Elek. und Maschinenbau.*

ITALY.—The Consiglio dei Ministri has authorised the concession to the Società Varesina per Imprese Elettriche for the construction of an electric railway from Ghirla to Ponte Tresa, of a length of 9,030 m The line forms a branch of the same company's existing line running from Bettole di Varese to Luino. Its estimated cost, including rolling stock, is 1,687,480 lire, but the Government gives a yearly subvention of 6,487 lire per km. for 50 years.—*L'Ingegneria Ferroviaria.*

Coventry.—The B. of T. has sanctioned the borrowing by the Corporation of £220,538 for the purchase of the tramways and incidental matters. The Committee which has the matter in hand recommends the Council to expend £20,475 on the purchase of 10 additional cars and new construction works, which do not include any lengthening of existing lines.

Dewsbury.—At a special meeting of the T.C. last week, it was decided to apply to the Board of Trade for a provisional order for the purpose of reviving and extending the time for the exercise of the powers of the Dewsbury Corporation Tramways Order, 1911.

Doncaster.—An inquiry was held by the Light Railway Commissioners on Saturday last into the Corporation's application for powers to borrow £40,700 for tramway extensions in the directions of Brodsworth and Warmsworth. Consideration of the matter has been adjourned.

Halesworth.—An inquiry was held here on July 16th by the Light Railway Commissioners relative to the Light Railway Co.'s proposal to construct a line between Haleswo.th and Cratfield, which will complete the service between Haughley and Halesworth. The estimated cost is £36,109. The Commissioners will report in favour of the order.

Huddersfield.—The Tramways Committee has instructed the town clerk to promote a Bill to obtain Parliamentary powers for the construction of tramways in the following districts: Brighouse, Elland, Marsden, Mirfield, Longwood (Dod Lea), Crosland Hill Road, and Kirkheaton Railway Bridge.

Japan.—The work of electrifying the Karuizawa section of the Japanese State Railways has just been completed. The line passes through 26 tunnels, which were very objectionable to passengers, owing to the smoke from the engines. By the adoption of electric traction all trouble from this cause is avoided, and greater speed is attained.

Liverpool.—On Wednesday, the 17th inst., a tramcar got out of control while descending James Street. On the way down it crashed into another car proceeding in the same direction. Six people were injured, one seriously.

Mexico.—H.M. Consul at Tampico reports that the concession for an electric tramway system there has recently been acquired by British capitalists, and active work on construction will be started immediately. The same company have also purchased both of the existing electric light plants and intend constructing a central power station for the lighting of the city, as well as for working the electric tramways.

The British Vice-Consul at San Luis Potosi reports that a very favourable concession has recently been granted by the State Legislature to a British company for the construction and working of an electric street railway in that town.—*Board of Trade Journal.*

Portsmouth.—The general manager of the Corporation Tramways, Mr. W. R. Spaven, reports that the working of the system for the year ending March 31st resulted in an income of £112,602, an increase of £8,097; the expenses were £51,879, leaving a gross profit of £60,723, which, together with bank interest, amounted to £61,412 (£6,671 increase). Capital charges absorbed £39,365, leaving a balance, with £1,989 brought forward, of £24,035 (£7,351 increase). Of this, £8,694 was transferred to the renewals fund, £2,000 to reserve and insurance, £4,000 to the rates, and £8,068 was carried forward. The revenue worked out at 12·261d. per car-mile, an increase of 0·626d., and expenses at 5·649d., compared with 5·567d. Power cost 0·467d. per car-mile. Passengers carried were over 25 millions, an increase of two millions, and the total car-mileage was 2,204,042.

TELEGRAPH and TELEPHONE NOTES.

Argentina.—The Government intends to make compulsory the introduction of wireless equipments on all passenger boats. A Bill has been introduced into the Chamber making the wireless service up to 1,000 km. from the Argentine Coast a State monopoly.—*Elek. Nachrichten.*

Australia.—It is reported that the Marconi Co., which some months ago commenced an action against the Postmaster-General for alleged infringement of patent rights, has now offered to sell its rights to the Federal Government.

France.—The Compagnie Générale Radio-Télégraphique has just carried out experiments with a special musical spark arrangement on board the *Savoie*, of the Transports Maritimes Co. The results are said to have been satisfactory, and to demonstrate the advantages of the new method. The company will shortly

install wireless apparatus on the *Paul Local* and the *Chili*, ships of the Messageries Maritimes Co. Eight mail boats of the Compagnie sud Atlantique are likewise to be equipped with wireless apparatus.—*Journal des Postes.*

French Indo-China.—A sum of about £30,000 has been allotted by the Government for the erection of wireless stations in French Indo-China. The installations comprise a chief station at Saigon, on which £24,000 is to be spent, and a dependent station at Hué to cost £4,000. The range of the Saigon station will cover the Indian Ocean and the Pacific, and it will act in the extreme East the rôle of the Eiffel Tower in Europe. Besides communicating with ships to and from China, Australia and the Suez Canal, it will supply the correct time and forward Press and exchange news, meteorological telegrams, &c. The Saigon station will cover a radius of 8,000 km., and the electric equipment will be exactly the same as that of the Eiffel Tower.

Germany.—The Postal Authorities have decided to copy the Swedish example and to install automatic telephones in some of the busiest and noisiest thoroughfares of Berlin, with a view to testing the innovation under the worst conditions. Should the results be satisfactory, automatic telephones will be installed throughout the city.—*Elek. Nachrichten.*

Imperial Wireless Stations.—The agreement between the Postmaster-General and Marconi's Wireless Telegraph Co., Ltd., was published on Tuesday, together with an official explanation of the policy of the Government. It is stated that the Governments concerned will own and work the stations on their respective territories. In view of the facts that the Marconi Co. possessed unique experience in the transmission of long-distance wireless messages, and that foreign Governments were commencing the erection of long-distance installations, so that prompt action was essential, the Government decided to secure the assistance of the company in carrying out at once the necessary works. The Postmaster-General, acting for the Governments concerned, will provide the sites, on which the company will erect the installations in accordance with specifications drawn up by the Postmaster-General. If other commercial stations having a range of at least 2,000 miles are required during a period of five years by any of the Governments taking part in the agreement, the company will have the exclusive right of providing them, at a cost of £60,000 each. All the patents and information at the disposal of the company will have to be placed at the service of the Postmaster-General during the "royalty period," but if the Government adopts another system not using any of the Marconi patents, it may terminate the "royalty period" at any time. Subject to this proviso, the agreement and royalty period will run for 18 years, and if not then terminated, for 28 years. A speed of 20 words a minute under the duplex ordinary system, and 50 words on the simplex automatic system, is provided for. During the royalty period, besides paying for the sites, plant and buildings, and the cost of trial working, the Goverment will pay the company a royalty of 10 per cent. of the gross receipts.

London Telephone Service.—In reply to a question in the House of Commons last week, the Postmaster-General stated that he did not regard the present situation as satisfactory; but the provision of extensions to existing exchanges and the construction of new exchanges to make good the deficiencies were being pushed on as quickly as possible. The staff available was not sufficient to cope with the demand for telephones, and the amount of work involved in the extension of exchanges and the transfer of overhead wires to underground lines was abnormal. Additional men had been employed, but the use of partially skilled assistance in the endeavour to meet the requirements had, to some extent, increased the difficulties. The trained staff was being increased as rapidly as possible. Complaints regarding the giving of "engaged" signals when the lines were possibly not engaged numbered only 0·05 per cent. during the month of June, and complaints of false calls amounted to 2,857 out of 8,295,030 calls in that month. The average time taken to answer signals observed during the latter half of 1911 was 7·1 secs., and during the first half of 1912 it was 6·9 secs. The percentages of irregular cut-offs to total calls observed during the same periods were respectively 0·75 and 0·62. Since December, 17 exchanges had been closed, 8,142 subscribers being transferred to other exchanges, and six new exchanges had been opened. Five entirely new exchanges were in course of erection, and seven new exchanges to replace existing boards. Eight extensions had been completed since the beginning of this year, and 20 were in progress. Eight further extensions were about to be applied for.

CONTRACTS OPEN and CLOSED.

OPEN.

Aberdare.—July 29th. (*a*) Additional plant at the generating station; (*b*) construction and equipment of tramways and railless system for the U.D.C. See "Official Notices" July 5th.

Ashton-under-Lyne.—July 30th. One 400-KW. motor-generator, one fuel economiser, two boiler feed pumps, coal elevator and conveyor and ash elevator, for the Corporation. See "Official Notices" July 5th.

Atherton.—July 31st. One 250-KW. single-phase transformer, for the U.D.C. See "Official Notices" July 19th.

Australia.—NEW SOUTH WALES.—August 28th. Common-battery and automatic switchboards, for Newton, Glebe and Balmain, for the Postmaster-General's department. See "Official Notices" to-day.

SOUTH AUSTRALIA.—October 1st. Telephone switchboards at Unley, Adelaide, for the Postmaster-General's department. See "Official Notices" to-day.

October 1st.—Telephone switchboards at Norwood, for the P.M.G.'s department. See "Official Notices" to-day.

October 22nd.—Telephone switchboard at Port Adelaide, for the P.M.G.'s Department. See "Official Notices" to-day.

VICTORIA.—October 22nd. Fourteen sections of common-battery multiple switchboard, for the P.M.G.'s department. See "Official Notices" to-day.

August 6th.—9,200 yd. of ·2 sq. in. concentric cable, and 2,200 yd. of ·1 sq. in. concentric cable for the Melbourne City Council. See "Official Notices" to-day.

NEW SOUTH WALES.—September 11th. Telegraph, telephone and electric material for a year, for the P.M.G.'s Department.

Barton-upon-Humber.—The Lighting Committee of the U.D.C. is inviting tenders for the lighting of the town by gas, electricity or otherwise during the coming winter months.

Belgium.—August 3rd. The Ghent Exhibition Co. is inviting tenders for the supply, installation and maintenance of the high-tension cables, telephone cables and transformer boxes required in connection with the Exhibition. Particulars may be obtained from, and tenders are to be sent to, La Société de l'Exposition, Rue des Moineaux, Ghent.

August 3rd.—The Belgian Post and Telegraph authorities at La Bourse, Brussels, are inviting tenders for the supply of a quantity of telephone cable.

Blackburn.—August 3rd. Steam coal, for the Corporation Electricity Department, for a year. Mr. P. P. Wheelwright, electrical engineer, Jubilee Street.

Bradford.—July 30th. Electric lighting and sundry other work for the new premises of the Bradford District Bank in Commercial Street and Cheapside, Halifax. Messrs. Richard Horsfall and Son, architects, 22A, Commercial Street, Halifax.

Bulgaria.—SOPHIA.—Supply of electric lamps, measuring instruments, arc lamp pillars, machine tools, &c. Railway and Port Administration, Sophia.

Canada.—August 1st. One 500-KW. steam-driven generating set, for the City Commissioners, Moose Jaw, Sask. See "Official Notices" July 12th.

Canary Islands.—Tenders have just been invited by the municipal authorities of Telde, Las Palmas, for the concession for the electric lighting of the town during a period of 30 years.

China.—August 13th. High and low-tension sub-station switchgear, for the Shanghai Municipal Council. See "Official Notices" to-day.

Dublin.—August 7th. High-tension switchgear and accessories for the Corporation. See "Official Notices" to-day.

August 7th.—Oerlikon and Westinghouse motors and pumps, for the Corporation. See "Official Notices" to-day.

Halifax.—August 5th. Portable X-ray switchboard, &c., for the Guardians. See "Official Notices" to-day.

Hull.—July 31st. Steam and water pipes, pumps, &c., for the Corporation Electricity Department. See "Official Notices" July 19th.

Italy.—ROME.—July 31st. Supply and erection of electric light and mechanical fittings in the new building of the Ministry of Agriculture, Industry and Trade, at an estimated cost of £2,000. Guarantee deposit, £100, and eventually one-tenth of total cost.

London.—L.C.C.—July 30th. Electrical installation at the County Secondary School, Streatham. See "Official Notices" July 19th.

A committee is about to invite offers for water level indicators for the new engine-house at the Abbey Mills pumping station, and a telephone apparatus and electric wiring for use in connection therewith.

New Zealand.—August 16th. Electric motor and induced-draught fan for Christchurch City Council. Tenders to City Surveyor. Deposit £5. Copy of specification can be seen at Board of Trade Commercial Intelligence Department, London, E.C.

Nottingham.—The Electricity Committee wants tenders for coal required at the Talbot Street and the St. Ann's Well Road generating stations for 12 months. Mr. H. Talbot electrical engineer.

Rosario.—October 15th and September 21st. According to the *Review of the River Plate*, the Municipality is calling for tenders, until October 15th, for a second system of electric tramways, including their construction and working. Full particulars from the Municipality. Tenders for the public electric lighting will be opened on September 21st.

Russia.—According to an advertisement appearing in the *Times* on July 23rd, the St. Petersburg C.C. will, on August 1st, consider tenders for erecting at the principal water-pipe station a station for distributing filtered and ozonated water over the free grounds existing at the principal station and also on the grounds which will become free after the demolition of the group of English filters. The successful contractor will also have charge of the working of the ozonated filtered station during a period of two years. A guarantee of 400,000 roubles is to be paid.

Spain.—July 31st. The municipal authorities of Merida (province of Badajoz) are inviting tenders for the concession for the electric lighting of the town during a period of 15 years. Particulars may be obtained from, and tenders are to be sent to, El Secretario del Ayuntamiento de Merida, Badajoz.

August 3rd.—The municipal authorities of Telde invite tenders for a 30 years' concession for the provision of electric light and power for the town.

August 10th.—Tenders are also invited by the "Dirección General de Telegrafos," Madrid, for the installation and working of a telephone system in Cestro Urdiales (Santander). The *Board of Trade Journal* states that although these contracts will doubtless be awarded to Spanish firms, the carrying out of the work may involve the purchase of some materials out of Spain.

Sunderland.—August 1st. Two steam-driven boiler feed pumps, one air compressor, one motor-driven centrifugal pump, pipework and valves, for the Corporation. See "Official Notices" July 19th.

Swansea.—July 30th. Alterations and additions to suction and discharge pipes, work for suction chambers, strainers, &c., for the Corporation Electricity Department. See "Official Notices" July 19th.

Turkey.—CRETE.—October 21st. Tenders will be received at the "Bureau de la Mairie," Canea, for a 50 years' concession to construct and work an overhead system of electric tramways in Canea and the neighbourhood. Copies of the *Cretan Official Gazette*, containing the conditions and further particulars regarding these concessions, may be seen at the C.I. Branch of the Board of Trade, London, E.C.

Walsall.—July 30th. High and low-tension switchgear for the Corporation. See "Official Notices" July 12th.

West Ham.—August 1st. Electric light installation (800 points) at the Forest Gate Sick Home, for the B.G. See "Official Notices" July 19th.

CLOSED.

Bath.—The T.C. has accepted the tender of Messrs. Hughes & Stirling for a dust destructor, at £4,069.

Bexhill.—The Council has accepted the tender of Messrs. Denham, Fawcus & Co. for 1,000 tons of Tibshelf Peas or Shipley Peas, at 18s. 9d. per ton.

Coventry.—The General Committee of the Coventry and Warwickshire Hospital has accepted the tender of Messrs. Lee, Beesley & Co., of Coventry, for installing the electric light in the new wing, at £912; and that of Waygoods, Ltd., for a lift, at £404.

Dundalk.—The Guardians received the following tenders for the electric lighting installation at the workhouse:—

Gask'n Bros.	(accepted) £133	P. J. Watters	£153
		J. C. Meldon	£144

Durham.—The Rural Council has accepted the tender of the Durham County Electrical Power Distribution Co. for installing the electric light at Honghall Hospital, at £83.

Germany.—The Allgemeine Electricitats Gesellschaft, of Berlin, has secured a contract for the establishment of a central electric lighting station in the town of Hameln.

Greenock.—The Corporation has accepted the tender of Messrs. Chamberlain & Hookham, for meters.

London.—HACKNEY.—The Electricity Committee received the following tenders in connection with the extension of the generating station:—

Boiler house plant.

Babcock & Wilcox, Ltd.	(recommended)	£7,105
Clark, Chapman & Co., Ltd.		7,827
Howden Boiler Co.		8,000
Bennis & Co., Ltd.		1,913

Induced-draught plant.

Howden Boiler Co.		£500
Matthews & Yates, Ltd.		794
Babcock & Wilcox, Ltd.	(recommended)	869

The engineer, in reporting, pointed out reasons why in this case the highest tender should be accepted. It complies in every respect with the specification, and includes far more substantial plant than that offered by the next tenderer. The motor fan is more powerful, and the chimney weighs 13 tons as against 7½ tons. The Howden tender could only have been accepted if the whole of the Howden system of generating plant had been adopted.

Economiser.

Babcock & Wilcox, Ltd.	(recommended)	£1,405
E. Green & Sons, Ltd.		1,417

Both tenders comply with specification, and in either case the economiser would be manufactured by the patentees, E. Green and Son, Ltd.

Feed pumps.

J. P. Hall & Sons, Ltd.	£499
F. Friedenthal	502
Nicholls Bros.	566
Babcock & Wilcox, Ltd. (for J. P. Hall or other approved pump)	574
Foster Bros., Ltd. (for Hall pump)	593
Foster Bros., Ltd. (for Nicholls pump)	621
G. & J. Weir	690
Isaac Storey & Co.	698
Clark, Chapman & Co., Ltd.	718
Foster Bros., Ltd. (for Weir pump)	763
British Westinghouse Electric and Manufacturing Co., Ltd.	774

The specification called for "Weir" or other approved pumps. The engineer says:—"The lowest tender for 'Weir pumps' is that of the makers, G. & J. Weir (£690). There are three lower tenders, viz., J. P. Hall & Sons, Ltd., £499; F. Friedenthal, £502; and Nicholls Bros., £566. All these pumps are of lighter construction than the Weir, weighing 50½ cwt., 60 cwt. and 48 cwt. respectively, as against 84 cwt. for the Weir. Hall's pumps, however, have a good reputation. Excellent service has been obtained from, and we have spent very little money on maintaining, our Weir pumps, which have been in use for a large number of years. I recommend that the tender either of G. & J. Weir, Ltd. (£690), or of J. P. Hall & Co., Ltd. (£499), be accepted."

Coaling plant and bunkers.

E. Bennis & Co., Ltd.	£7,122
W. J. Jenkins & Co., Ltd.	7,518
Strachan & Henshaw, Ltd.	7,550
Spencer & Co., Ltd.	7,609
Babcock & Wilcox, Ltd.	7,634
New Conveyor Co., Ltd.	7,953
Robert Dempster & Sons, Ltd.	8,993
Heenan & Froude, Ltd.	9,170
Mechan & Sons, Ltd.	11,353

These tenders may be divided into two main classes:—(*a*) Those in which the telpher runs on the top of a rail, called top-rail systems; (*b*) those in which the telpher runs on the bottom flanges of an I section runway, called bottom-rail systems. The engineer says:—"It is a debatable point which of these two methods is to be preferred, and the best method does not at present appear to have been definitely decided by practice. I have studied the matter very carefully, however, and am inclined to the opinion that the top-rail system will be the more economical in maintenance, and will operate faster round curves and over switches of the system, which will be unavoidable in connection with further extensions of the coaling plant at a later date. Four of the tenders are for the top-rail system, and four are for the bottom-rail system, while one offers both alternatives." The engineer states why he does not recommend the acceptance of the lowest tender, and recommends that the tender of W. J. Jenkins & Co., Ltd., Retford, or that of Strachan & Henshaw, Ltd., Bristol, who have erected a similar plant at Stepney, be accepted for the plant.

Pipework and valves.

Brightside Foundry and Engineering Co., Ltd.	£3,958
John Spencer, Ltd.	4,105
Foster Bros., Ltd.	4,774
Aiton & Co.	4,798
Babcock & Wilcox, Ltd.	5,223
Edward Le Bas & Co.	6,680

The engineer recommends that the tender (£4,105) of John Spencer, Ltd., or that (at £3,958) of the Brightside Foundry and Engineering Co., Ltd., be accepted.

Travelling crane.

Chatteris Engineering Works Co.	£816
Sir William Arrol & Co., Ltd.	866
S. H. Heywood & Co., Ltd.	881
Royce, Ltd.	920
Carrick & Ritchie, Ltd.	921
Babcock & Wilcox, Ltd.	937
Herbert Morris, Ltd.	937
John Smith (Keighley), Ltd.	970

The engineer, after comparing the tenders, says that it is very difficult to decide between the two lowest tenders, but he recommends that a final decision should be given in favour of either the tender of the Chatteris Engineering Co., Ltd., or that of Sir William Arrol & Co., Ltd.

Turbine-alternator, exciter and condensing plant.

Willans & Robinson, Ltd.	£7,950
Belliss & Morcom, Ltd.	8,660
James Howden & Co., Ltd.	9,087
Brush Electrical Engineering Co., Ltd.	9,326
Dick, Kerr & Co., Ltd.	9,450
British Westinghouse Electric and Manufacturing Co., Ltd.	10,234
Richardsons, Westgarth & Co., Ltd.	10,638
British Thomson-Houston Co., Ltd.	10,867
C. A. Parsons & Co., Ltd.	11,875
A.E.G. Electrical Co., Ltd. (tender opened July 11th, 1912)	9,400

(*Continued on page* 143.)

ELECTRICITY IN A SPANISH LEAD MINE.

[BY OUR BERLIN CORRESPONDENT.]

ONE of the Spanish mines where electrical operation has been adopted on a large scale is that of El Guindo, in the southern range of the Sierra Morena, which contains abundant deposits of lead ore.

Fig. 1 illustrates the plant recently installed there by the A.E.G. On the extreme left are seen the winding tower and building for the winding engine; on the right (not seen in the view) is the transformer station connected to the high-tension transmission line, while the centre is taken up by the separating plant, which, in view of the large quantity of material worked in the mine, plays an important part. It is practically impossible to form any more than a mere conjecture as to the actual value of a lead ore deposit. Whenever the vein is lost sight of, the only thing to be done is to drive a shaft for some depth and to make cross-cuts to the right and left at various levels, until the ore is again encountered. In lead mining it is therefore necessary to start with a small mechanical equipment, and only to extend the plant quite gradually. As, moreover, the El Guindo Mine is situate at about 7 to 8 km. from the nearest railway station, the question of economy as regards the actual consumption of fuel had to be considered much more carefully than is usually the case.

FIG. 1.—HEADWORKS OF EL GUINDO MINE.

However, the electrification of the mine was facilitated by the hydro-electric power house of the Mengemor Electric Supply Co., installed by the A.E.G. on the Guadalinar, a tributary of the Guadalquivir. In fig. 2 the interior of the turbine room with the two 450-K.V.A. turbo-generators may be seen. The company undertook to supply the mines with electrical energy at the comparatively low price of 12 centimos per KW.-hour, but under two rather onerous conditions, namely, that the mines would bind themselves to a minimum consumption per year, and at the same time agree not to exceed a given amperage. These conditions are particularly difficult to fulfil with a service similar to that described here. By far the greater quantity of energy is consumed by motors working very intermittently, such as those for winding and the driving of the stamp mills, washers, &c. Forms of service which otherwise, as, for example, in coal mining, give a certain uniformity to the power supply in the electric generating station, such as pumping, ventilation, compressed-air supply, and lighting when necessary, are here of subordinate importance, and are in part non-existent.

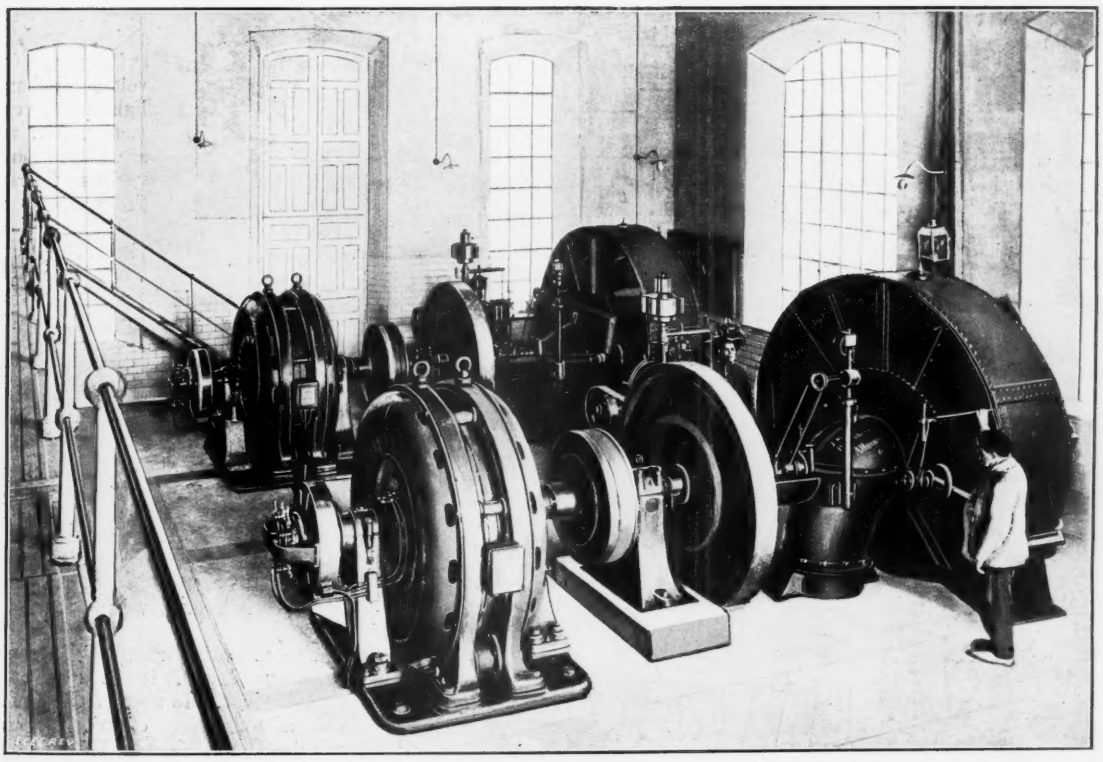


FIG. 2.—INTERIOR OF TURBINE ROOM, MENGEMOR POWER STATION.

When the great advantages accompanying the use of electric power for working the mines in question had begun

to be realised, it was at first decided to replace the largest coal consumers, viz., the various small steam engines driving the washers and stamp mills, and a number of small pumps working underground, by electric motors, and the first electric generating station which was erected at the Guindo mine consisted of some flue boilers and two 150-H.P. Sulzer steam engines, from each of which a continuous-current generator and a three-phase machine were driven by belts. Continuous-current motors were preferred for certain operations on account of their more economical speed regulation, while three-phase motors, on account of the advantages of higher voltages in transmitting power to long distances, were considered preferable for other purposes.

As soon as the Mengemor Electricity Co. began its operations, the mine authorities commenced the electrification of their plant on a larger scale. It was first necessary to erect an efficient steam power station to serve as a stand-by in the event of a failure in the supply derived from the Mengemor Co. In spite of the most careful planning of the water-power station and its steam reserve, a power distributing plant of this kind necessarily comprises an element which can never be relied upon absolutely, in its transmission line 20 kilometres in length, which is carried over mountains and valleys through very desolate districts. The reserve station was erected at the Manzana mine and consists of a portable engine of an output of approximately 500 H.P., supplied by Messrs. R. Wolf, of Magdeburg, which drives a 400-K.V.A., 1,150-volt, three-phase generator at 600 R.P.M. by means of two pulleys constructed as fly-wheels. This set is illustrated in fig. 3.

These two steam stations are, of course, only reserve stations, electrical energy being usually obtained from the Mengemor Co. This company supplies three-phase current at a pressure of 22,500 volts, which is transformed down to the pressure of 1,150 volts used on the mines by means of transformers. At each of the three mine shafts there is a transformer station containing one or more transformers, with output ranging from 200 to 300 K.V.A., together with the necessary accessories, such as switchgear, excess voltage dischargers, lightning arresters, meters, &c., which are placed on the various floors of the transformer stations. To supplement the plant a converter set has also been provided, which serves the double purpose of generating about 20 K.V.A. continuous current for lighting and for driving the continuous-current motor still in use on the one hand, and improving the power factor on the other hand, for which purpose a 150-K.V.A. three-phase synchronous motor has been selected. The question of the power factor is one of special importance in the present instance, as the conditions under which the energy is supplied prohibit the current taken from exceeding a certain fixed value (and not the output).

The most important winding plant, as above stated, is installed at the Guindo shaft. In spite of the considerable advantages of electrically-operated winding engines (greater safety in operation, permanent readiness without any necessity of keeping a boiler under steam, and remarkable economy due to a reduction in the staff), the electrification of the main pit winding plant was postponed for a considerable time, mainly because of the uncertainty with regard to the extent of the available ore deposits. When, however, the appearance of the Mengemor Co. placed electrical energy within easy reach, at a relatively

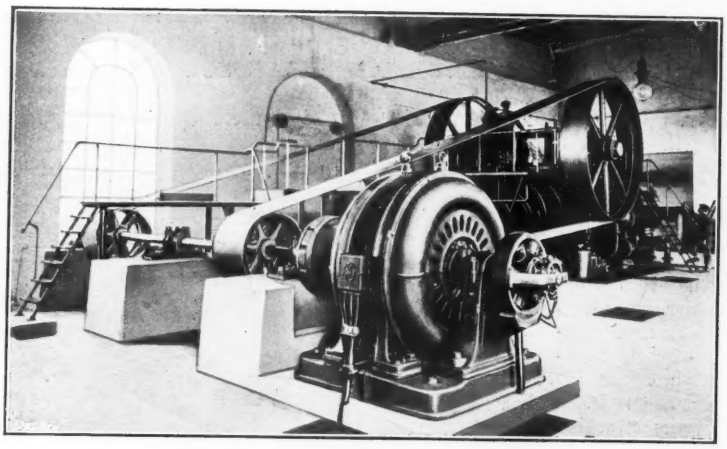


Fig. 3.—Reserve Steam Plant at Manzana Mine.

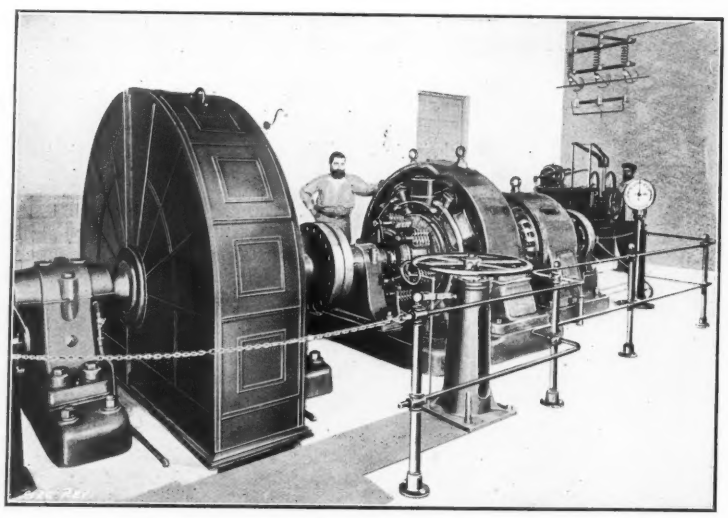


Fig. 4.—Ilgner Plant at El Guindo Mine.

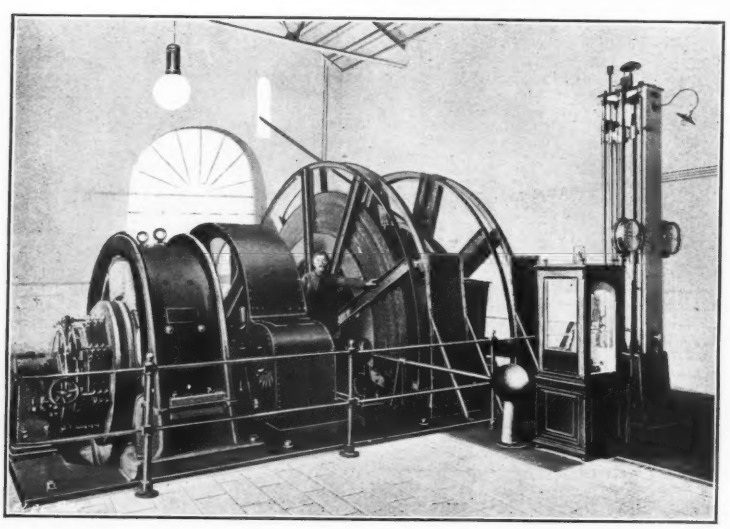


Fig. 5.—Electric Winding Engine.

low price, the advantages of electrical winding were found to be so considerable that this mode of operation was soon adopted. Provision was made to compensate any fluctu-

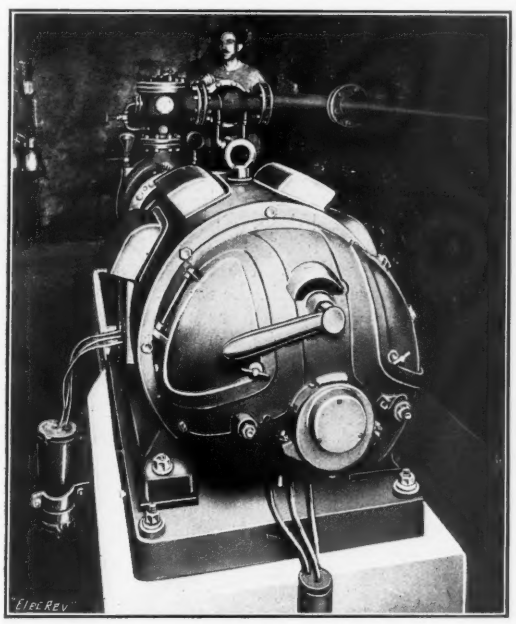


FIG. 6.—A.E.G. 3,000-R.P.M. MOTOR AND PUMP.

ations in load by means of the well-known A.E.G. Ilgner-Leonard system.

In fig. 4 is shown the Ilgner plant installed at the Guindo shaft, and in fig. 5 the winding engine, inclusive of the motor and auxiliary apparatus. The three-phase motor of the converter (farthest to the right in the figure) works at 1,150 volts, 50 cycles; the continuous-current dynamo (in the middle of the figure) yields an average of 180 KW., and during some three minutes 360 KW., the pressure being controlled between plus and minus 450 volts. The fly-wheel, which is enclosed in a sheet metal housing (to the left in fig. 4), so as to diminish losses by air friction, is 5 tons in weight. The whole set can be controlled between 730 and 600 R.P.M.

The winding motor absorbs on an average an input of 225 H.P. and temporarily 450 H.P. at 120 R.P.M. The mechanical part of the winding engine has been supplied by Messrs. Gebrüder Weissmüller, of Frankfort-on-Main. The engine is designed on the following data :—

Maximum useful load...	2,500 kilogrammes.
Maximum winding load	3,500 ,,
Maximum depth (to be reached in a few years)	600 metres.
Winding speed	4 ,, per sec.
Number of winding trips per hour ...	10

An electrical winding capstan of about 30 H.P. has been installed in the same shaft for supervision trips and similar purposes.

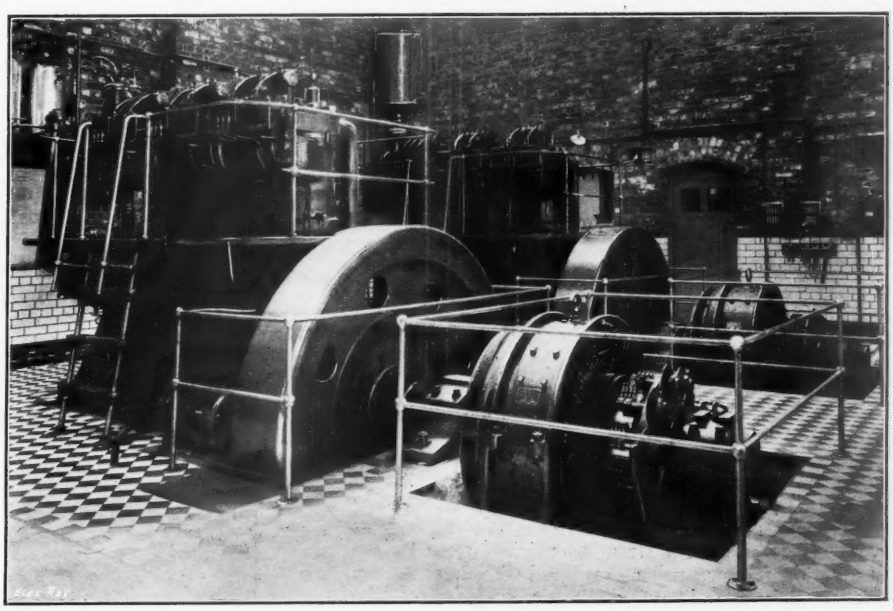
The pumping presents some difficulties, though this mine, like most other mines in the same district, only contains relatively little water. Still, the fact that small amounts of water have to be raised to considerable heights makes the operation of centrifugal pumps uneconomical. Furthermore, the depth of the shaft increases from year to year as the working advances, so that centrifugal pumps designed for a given head could not immediately be used. On the other hand, however, there could be no question of installing expensive piston pump sets. These difficulties were solved by adopting a special 3,000-R.P.M. three-phase motor of the A.E.G.

At this high speed of revolution, centrifugal pumps raising small amounts of water to considerable heights could be constructed, while the low price of such machines allowed a number of them to be installed at different levels, so that the water pumping could be effected by stages. Some small piston pumps driven by electricity were used to supplement this installation.

Two centrifugal pumps, each of 150 H.P., raising as a maximum 800 litres per minute against a head of 465 metres, have been installed at El Guindo. In the neighbouring Manzana shaft there are two sets of 100 H.P. each, for 700 litres per minute against a head of 290 metres, one of which is shown in fig. 6. Finally, the Urbana shaft employs a similar plant of 100 H.P., but for 1,500 litres per minute against a head of 180 metres.

All the auxiliary machinery is operated by electricity. The separating plant of the Guindo and Manzana mines comprises a number of motors driving stamp mills, washers and sieves. In both these mines there are further installed piston compressors supplying compressed air for the automatic stone drills, each of which is operated by a 60-H.P. motor. There are further a number of motors for the workshops, &c.

Finally, there is in course of construction a wire-rope railway 8 kilometres in length connecting the mines with La Carolina. This will be operated by a 30-H.P. electric motor.



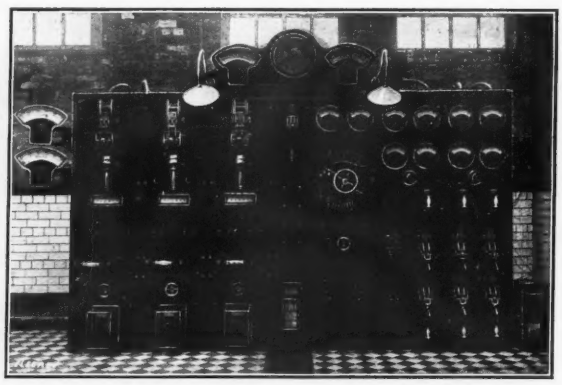
DUNDALK ELECTRICITY WORKS: MIRRLEES-DIESEL ENGINES AND SIEMENS DYNAMOS.

DUNDALK ELECTRIC LIGHTING.

THE history of electricity in Dundalk dates from the year 1896, when a syndicate was formed, with the principal object of establishing an electric tramway system between Dundalk and Blackrock. An application for a provisional order was made by the Town Commissioners in that year, on the understanding that the syndicate would pay the expenses of the order, and the matter in due course was brought before the Grand Jury, and sanctioned by them.

The total length of the tramways was 5¾ miles, and the estimated cost of the undertaking was £40,000.

In 1900 an extension of the order was applied for, as it was found that the enormous increase in the price of the materials had upset the calculations of the promoters. The extension was granted, but the scheme eventually fell through, after a considerable amount of expense had been incurred. The Council at a later date unanimously proceeded to promote a Bill in Parliament for the present electric lighting scheme.

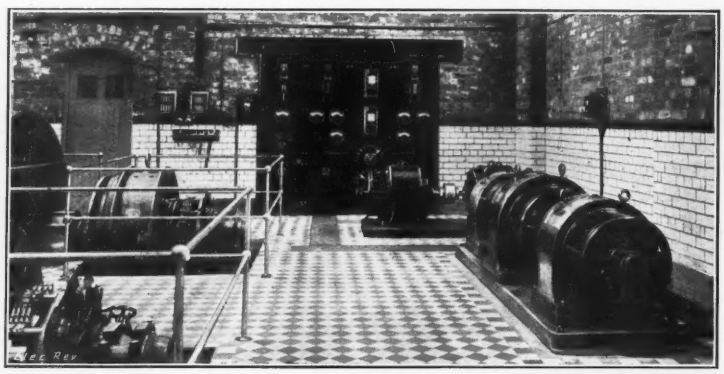


Dundalk: Main Switchboard.

In September, 1907, the Urban Council retained Messrs. Miller, Wilson & Pegg, consulting electrical engineers, of Belfast and Liverpool, to make an inspection of the town and draw up a report on the prospects of a scheme of electric lighting. This report was furnished, and considered by the Council, and the financial prospects of the undertaking as a probable commercial success being considered satisfactory, steps were taken to secure the necessary borrowing powers, which were granted on application to Parliament. Resolved upon making no mistake, the Council accepted schemes from several other engineers, and finally referred all the schemes submitted to the arbitrament of Sir A. B. W. Kennedy; acting on his advice, they unanimously adopted the scheme proposed by Messrs. Miller, Wilson & Pegg.

The Electric Lighting Bill was in May, 1908, read the third time in the House of Commons, and in March, 1910, a Local Government Board inquiry was held, when the scheme was vigorously opposed by the Dundalk Gas Co. and a number of large ratepayers. It was mainly owing to this opposition that a subsequent Board of Trade inquiry was held, when the opposition strongly criticised some of the features of the scheme, such as overhead wires in secondary thoroughfares. The Board of Trade approved of the scheme, reserving power to review the circumstances as regards the overhead lines upon the expiration of a period of five years. In a letter to the Council they stated that, having regard to the nature of the soil of Dundalk, no better kind of electrical mains could be used than those proposed, no other system being better able to resist damage by heavy traction-engine traffic or from the effects of escaping gas or water. The Local Government Board also granted their sanction to the loan of £20,000 for the purpose of carrying out the scheme.

The work is now complete, and Dundalk can lay claim to the possession of one of the finest and most up-to-date electrical installations of any town of a similar size in the United Kingdom.



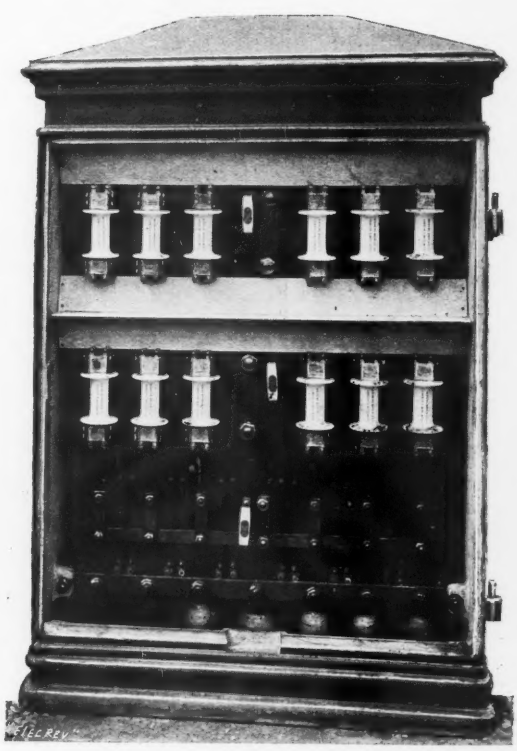
Balancer and Battery Switchboard.

The generating station, which is adjacent to the Technical Schools, is picturesquely situated on the old Grammar School garden, and centrally located in the supply area. The building of the station was commenced on September 1st by Mr. James McAdorey, contractor, Dundalk. Messrs. Siemens Bros. & Co., Ltd., who obtained the mains contract, commenced the work of laying the underground cables on December 12th, 1911.

The generating plant consists of two Mirrlees, Bickerton and Day Diesel oil engines, running at 250 revolutions per minute, and direct-coupled to Siemens generators, the full-load output being 400 amps. at 250 volts. In May last both these generating sets were subjected by the engineers to exhaustive tests at half-load, full load and overload; some particulars of these tests are given below. A third generating set, identical with the above, has been provided for, and will be erected within the next four months.

The main and battery switchboards were made by Messrs. Brooke, Hirst & Co., and the balancer and booster by the British Westinghouse Co. The storage battery, supplied by the Sandycroft Foundry Co., consists of 126 cells, and is capable of giving a normal discharge of 200 amps. for 3 hours, or 400 amps. for one hour, with an emergency discharge of 720 amps. for half an hour. The general scheme provides for direct-current three-wire supply at 220-110 volts. The underground feeders and distributors are Siemens three-core paper-insulated, lead-covered and steel-tape armoured cables. These are laid direct in the ground, and wherever possible are placed under the footpaths. There are 9 miles of overhead mains, and 2½ miles of underground mains.

There are 335 street lamps, varying from 20-c.p. in the back streets, and 50-c.p. and 75-c.p. in the main streets, up to 400-c.p. in the market-place. The lamp standards and



Feeder Pillar.

brackets are of the Haydn Harrison pattern. The street lighting from the overhead mains is divided into seven groups, in order to facilitate the control of the public lighting. The feeder pillar, shown on p. 142, is for one three-wire feeder, with twelve 200-ampere switch-fuses for six three-wire distributors. There are already over 150 applications for a supply, and of this number 101 premises are already supplied from the underground mains, and 15 premises from the overhead mains. It is owing to this large number of applications, considerably in excess of those anticipated, that the Council has decided at once to put in hand the third generating set as mentioned above. About 50 H.P. of motors has already been connected, and it is anticipated that over 200 H.P. in motors will be connected to the mains within the next six months. The new picture theatre, which is to be opened this month, will also be supplied from the town mains.

The charge for lighting purposes is 6d. per unit, with a sliding scale, and for power purposes from 2½d. down to 1d., according to the amount consumed. The works are under the capable management of Mr. P. A. Spalding, A.M.Inst.C.E., A.M.I.E.E., who came from Galway to take up the position of resident electrical engineer, and the entire scheme was carried out under the supervision of Mr. H. V. Pegg, M.I.E.E., A.M.Inst.C.E., of Belfast.

TESTS OF GENERATING PLANT.

CONSUMPTION OF FUEL OIL, IN LB. PER KW.-HOUR.

	No. 1 set.	No. 2 set.
Full load	·647 lb.	·648 lb.
Half load	·704 lb.	·726 lb.

Average thermal value of the crude oil by analysis, 19,376 B.TH.U.

B.TH.U. per KW.-hour: No. 1 set, 12,526; No. 2 set, 12,544.

REMARKS.—Both engines and dynamos ran very well throughout all tests; the exhaust from the engines was smokeless. Four samples of oil were taken during the full-load tests, and two samples were taken during the half-load tests.

Effect of sudden removal of full load on engine:—

Steady voltage at full load	247
Momentary voltage at instant full load was removed	255

Increase = 8 volts = 3·24 per cent.

Temperature rise on dynamo.

	After completion of 6 hours' full load.	After completion of 1 hour overload.
Commutator ...	40° F.	35° F.
Armature coils ...	51° F.	44° F.
Shunt coils ...	68° F.	56° F.

CONTRACTS CLOSED.

(*Concluded from page* 138.)

HACKNEY (*continued*).—After briefly summarising these tenders, the engineer advises the acceptance either of the tender of Willans and Robinson, Ltd., or that of Belliss & Morcom, Ltd.

Motor-generator or motor-converter.

General Electric Co., Ltd.	£2,421
Brush Electrical Engineering Co., Ltd.	2,832
Vickers, Ltd.	2,967
Electrical Construction Co., Ltd.	3,025
Bruce Peebles & Co., Ltd.	3,355
Bruce Peebles & Co., Ltd. .. .. .. (recommended)	3,500
British Westinghouse Electric and Manufacturing Co., Ltd.	3,760
British Thomson-Houston Co.	3,841
Siemens Bros. Dynamo Works, Ltd.	4,075
Dick, Kerr & Co., Ltd.	4,068

Switchgear and connections.

British Westinghouse Electric and Manufacturing Co., Ltd.	£1,585
Siemens Bros. Dynamo Works, Ltd.	1,790
British Thomson-Houston Co., Ltd.	1,960
Spagnoletti, Ltd.	2,123
Ferranti, Ltd. .. .. .. (recommended at £1,613)	2,958
Electrical Construction Co.	2,307
Johnson & Phillips, Ltd.	2,322
Whipp & Bourne, Ltd.	2,724

In referring to these tenders, the engineer recommends the acceptance of that of Ferranti, Ltd., at £1,613, the reasons being that, allowing for the reduction due in view of the switchgear being required for a motor-converter, the tender becomes £2,000. It is the lowest tender which approximates to compliance with the specification, and the firm are willing to make a further reduction, in view of the fact that a mistake was made in measuring the cables off the drawings. With these modifications, the tender becomes £1,613, and is the lowest complete and satisfactory tender.

It is also recommended that a contract be entered into with the Tudor Accumulator Co. for the renovation of the storage battery, at £2,379, and for its maintenance for 10 years, at £385 per annum.

The Council recently accepted the tender of Messrs. T. Wragg and Co. for 2½-in. and 1½-in. U-shaped earthenware troughs This firm now intimate that they are unable to accept the contract, and that of the Leeds Fire Clay Co., Ltd., is to be accepted, at 42s. 9d. and 36s. respectively per 100 yd. run laid.

POPLAR.—The B.C. has received the following tenders for the supply of a works switchboard, to control the motors for driving the auxiliary plant now being erected in conection with generating station extensions:—

Peoley & Austin ..	(accepted) £310	General Electric Co. ..	.. £351
Crompton & Co...	.. 279	E. F. Moy, Ltd... ..	.. 349
British Westinghouse Co., £356			

L.C.C.—The Highways Committee recommends the acceptance of the tender of Messrs. W. Cory & Son, Ltd., for the removal of ashes from the Greenwich generating station for one year, at 1s. 5d. per cubic yard.

Mansfield.—The T.C. has accepted the tender of the Western Electric Co. for cables, &c., for the extension of the mains to Woodhouse.

Norwich.—The Electricity Committee of the T.C. has accepted the following tenders for coal:—

T. Moy, Ltd.—800 tons of Hucknall Main slack, 14s. 9d. per ton.
Wm. Cory & Son, Ltd.—6,000 tons of washed peas, 10s. per ton.

The Electricity Committee has accepted the tender of Messrs. Brackett & Co., Colchester, for a self-cleaning water screen, at £278.

Sutton Coldfield.—The Corporation Electricity Department has provisionally accepted the following tenders:—

Le Blanc jet condensing plant and Worthington steel cooling tower.—British Westinghouse Electric & Manufacturing Co.
150-KW. steam balancing generator (with G.E.C. dynamos).—Belliss and Morcom, Ltd.

Walsall.—The T.C. has accepted the tender of Messrs. Vickers for a rotary transformer, at £692; and that of the Westinghouse Co., Ltd., for switchgear and connections, at £275.

FORTHCOMING EVENTS.

Institution of Electrical Engineers (Yorkshire Local Section).—Saturday, July 27th. Visit to the Acton Hall Colliery, Featherstone. Leave Central Station, Leeds (L. & Y. Railway), at 2.7 p.m.

NOTES.

The Marylebone Bonus.—The Electric Supply Committee of the Marylebone Council reports having taken counsel's opinion with regard to the payment of a bonus of £519 to officers mentioned in a recommendation brought up by it at the last meeting of the Council. By an agreement between Mr. Seabrook and the Council the former receives a bonus equal to a percentage of the surplus revenue of the electrical undertaking, but this is subject to a proviso which provides that the Council shall not be bound to pay any bonus in respect of any year unless (1) the number of units sold increases during the continuance of the agreement at the average rate of 500,000 per annum, and (2) the average price charged during the year in respect of which the bonus is proposed to be paid is less by 5 per cent. than the average price charged in the preceding year. In the year ended March 31st, 1912, the Committee states that there was a substantial surplus, in respect of which the bonus would have been payable if the two conditions laid down had been complied with. The condition as to the increase in the number of units was amply complied with, but not the condition with regard to the reduction of price, as although the average annual reduction since the commencement of the agreement exceeds 5 per cent., the actual reduction of last year from the preceding year amounted to only 4·41 per cent. In these circumstances it seems quite clear that Mr. Seabrook cannot claim the bonus. Counsel was accordingly requested to advise (1) whether the Council can legally pay the bonus in accordance with the recommendation of the Electric Supply Committee; (2) whether the case comes within Sec. 64 of the Metropolis Management Act, 1855; (3) generally. The counsel's opinion is that if the Council, after due consideration, should decide to pay the bonus, it would be legally entitled to do so, and the Court would not interfere. With regard to Sec. 64 of the Metropolis Management Act, 1855, Mr. Seabrook is not concerned or interested in a contract with the Council within the meaning of the first part of that section, and in counsel's opinion, the second part of the section does not apply, for the bonus is part of Mr. Seabrook's proper salary . . . and allowances, for it is part of the sum which the Council has agreed to pay him in return for his services. On the whole, therefore, he is of opinion that the Council may pay the bonus if it thinks fit. As the 5 per cent. average reduction in the price per unit was not reached, and as an error occurred in respect of an over-credit in the adjustment on interest on bank balances, the Committee has decided to withdraw its previous recommendation, and has recommended the payment of a bonus of £450.

Fatalities.—An inquest was held at Failsworth Town Hall by Mr. W. Sellers, County Coroner, on Friday, on the body of George Henry Gibson (56), an electrician, who met with his death on the morning of the 17th inst. at Failsworth, whilst working in an electrical manhole.

Henry Gibson, deceased's son, identified the body of his father, who, he said, had worked for the Corporation for 17 or 18 years.

On the Wednesday morning his father was apparently in good health, and witness had never known him to have a doctor.

John Greenwood, a labourer, said that on Wednesday he was working with the deceased, painting and cleaning cables in the manhole. At 11.15, while he was above ground, he heard Gibson, who was in the manhole, shout "George!" He looked down, and saw that Gibson had his hand on a red cable covered with rubber. Witness pulled deceased off the cable, and saw that he was apparently dying. He ran for a doctor and other assistance, and when he got back with a policeman Gibson was dead.

The Coroner: Was the deceased wearing gloves?—No.

Jas. Walvin, a collier, of Ashton Road, Failsworth, said he helped to get the body out of the manhole.

Mr. Lee, mains engineer to the Electricity Department, said he visited the scene about two hours after the accident. It was quite probable that Gibson might have had a shock, but not a severe one. In that manhole they did not consider it possible for a man in ordinary health to receive a shock sufficient to cause death. As a matter of fact, they had 30 to 35 men engaged in such work as the deceased was doing every day, and they did not consider there was any danger, or it would not be allowed. The deceased was working in his ordinary boots, though the men had definite verbal instructions that when engaged in such duties, they must wear rubber shoes. Gibson had been cautioned and reprimanded on the 14th inst. for not wearing rubber shoes in a similar box, and new shoes had been supplied to him. At 2 o'clock witness tested the cables, and found that the voltage was 240, which was normal. In answer to a juror, witness said the department did not insist on the men wearing gloves, but they did insist on the use of rubber shoes. He had never seen a man working without such shoes. Witness did not think Gibson got a shock from the cable on which he had his hand when seen by Greenwood.

Dr. Heslop, who made a post-mortem examination of the body, was able to tell the jury that death was due to a sudden arrest of the act of breathing, which he said might have been caused by an electric shock. Both hands were clenched and the lower extremities of the body showed marked rigidity. There were no marks of burns. He could not account for the arrest of the breathing except by the shock. The deceased had a very weak heart. A shock would have much more effect on a man in that condition than on a man with a normal heart.

The jury returned a verdict that death was due to a shock and suffocation, the result of an electrical shock, and that there was no negligence by the Corporation.

A man named David Roberts was killed, and another man was severely burnt, at Messrs. Renton & Fisher's engineering works at Bathgate, on 7th inst., through a crane coming into contact with a live wire.

The Blyth Coroner was on Saturday notified of the death at Wallsend on Friday night of a boy named Charles Wilfrid Evans. A man found the body near Glover's Row. It was badly burnt about the left side of the neck and the left arm and hand, and was in contact with a live line.

At Messrs. Johnson's wire works, Forge Lane, Bradford, Manchester, on Sunday, Albert Thornton, a young man, newly married, of Windermere Street, Ashton Old Road, received a fatal shock whilst repairing a dynamo.

At an inquest at Fenton, Staffs., on Tuesday, it was stated that a gang of workmen were putting an iron girder into position at the Glebe Colliery, when it came into contact with an electric wire and rubbed off the insulating material. A 500-volt current went through the unfortunate men to the earth. Edward Roberts, the foreman, was standing on an iron plate, and was killed. The other men, who were on dry coal-dust, escaped fatal injuries.

On Wednesday Robert Riches, a labourer in the employ of Messrs. Blackwell & Co., contractors, of Westminster, was repairing the overhead wires on the electric railway, near Tulse Hill Station, when his hand came in contact with a live wire, causing instant death.

Annual Outings and Sports.—The Linolite Co.'s sixth annual outing took place on Saturday, July 13th. The party (numbering about 30), which consisted of the works and office staffs, Mr. A. S. E. Ackermann, engineer and manager, Mr. R. L. Matthews, assistant manager, and Mrs. Ackermann, drove from the company's offices in Westminster to Kingston, then through Surbiton and Esher to Oxshot, which was reached at noon. Luncheon and tea were served *al fresco* in a delightful garden, with a great variety of flowers and fruit at their best. After luncheon the party walked to Oxshot Heath, where a keenly-contested cricket match was played between the works and office staffs, resulting in a victory for the office. After tea the party drove back to London.

On Saturday, July 13th the head office staff and friends of the Armorduct Manufacturing Co., Ltd., went for their sixth annual outing, a party of between 60 and 70 going, as on previous occasions, for an up-river trip. Boarding the launch *Princess Beatrice* at Richmond they went to Walton, luncheon being served *en route*. In the afternoon during the return to Richmond tea was served, and shortly after 8 p.m. the company sat down to dinner at the Greyhound Hotel. Several toasts were drunk, and an impromptu concert was held. Mr. Marchant, the secretary, proposed the toast of the managing director, and Mr. Schmahl responded, calling attention to the fact that their staff had doubled in five or six years.

The annual outing of the White Electrical Instrument Co. took place in propitious weather on Saturday last, Brighton being the place visited, and a most enjoyable day was spent. Dinner was served at the Royal Pavilion Hotel. In replying to the toast proposed by Mr. T. Johnson of "The Health of Mr. White and the continued Prosperity of the Firm," Mr. White referred to the many advantages given by the new works, and attributed the increasing prosperity of the firm to the special facilities and up-to-date appliances they now possessed.

Upwards of 40 employés of Electrical Installations, Ltd., spent their annual outing on Saturday last, 20th inst., at Ramsgate. Luncheon was served at the Victoria Hotel. The afternoon was taken up by a brake ride through the country to Minster, where tea was served at one of the well-known tea gardens. The weather was all that could be desired, and a very enjoyable day was spent.

The Grantham employés of the Urban Electric Supply Co., Ltd., accompanied by Mr. J. E. Edmonds, went for their annual outing to Yarmouth on Saturday, and were joined by members of the Cromer staff

M.E. Tramway Sports.—On Thursday afternoon last week the M.E.T. Athletic and Social Club held its annual athletic sports meeting at Oakleigh Park, Whetstone. This is the fifth of these annual events, and this year, for the first time, the Tufnell Park Athletic Grounds was not the place of meeting. The change to Oakleigh Park was more than justified by the very large gathering of members and friends of the club and their wives and children. The club is a strong and excellently organised Institution with a membership of about 600. It has cricket and football sections, recreation rooms provided by the company and equipped for billiards, &c., by the club, and a military band, whose performances at the Alexandra Palace have already received praise in these columns. In the cricket section a challenge shield has been presented to the club by Mr. W. E. Hammond, traffic manager, to be competed for by the different branches; and in the football section Mr. A. H. Pott, the chief engineer, has presented a challenge shield for a similar competition. Among those present on the ground last week were Messrs. A. L. Barber (secretary to the company and chairman of the Sports Committee), W. B. Bruce, W. E. Hammond, Gordon C. Innes, R. Johnston, J. McLeod, A. H. Pott, O. Robson and B. G. West, all of whom acted as judges, and Mr. W. P. Sparks, who acted as time-keeper and handicapper. The aforesaid military band, under Bandmaster E. Wallace, rendered efficient service during the carrying out of the very interesting programme of events.

The latter included running and walking races, potato race, three-legged races, tug-of-war contests between the several branches of the Club, in which the men competed with an earnestness and determination which it was good to witness, this good old-fashioned sport sustaining both a keen and prolonged interest, and at times excitement; a veterans' handicap, races for the ladies, and for little boys and girls, and many other events, giving an opportunity for members and their families, even down to youngsters of five years of age, to demonstrate their abilities. We were going to mention "all the winners," but space fails us. The programme wound up with a Fire Drill Competition, and a consolation race. In the former, the competing teams were the Finchley, Wood Green, Edmonton, Hendon, and Stonebridge branches, also shops and staff. In the result "Wood Green" succeeded in winning the Challenge Cup from "Finchley," who had previously held it. A highly successful day wound up with the distribution of prizes by Mr. Henry Burt, J.P., the vice-chairman of the Middlesex County Council, and chairman of the Light Railways and Tramways Committee of that Council. Mr. Burt was first introduced by Mr. James Devonshire, the president of the Club, after which he, in a short speech, complimented the competitors on the close finishes, and the keen sportsmanship displayed by the members of the Club.

The Proposed Engineers' Club, Manchester.—A general meeting of those who had intimated their desire to join the proposed Manchester Engineers' Club was held in the Memorial Hall, Manchester, on the 16th inst. Mr. Daniel Adamson was elected chairman, and Mr. A. L. Green secretary (*pro tem.*). The chairman reported that the number of applications for membership exceeded 500, which was the figure suggested in the original circular issued by the Provisional Committee. It was unanimously resolved:—(1) To form an Engineers' Club; (2) to elect a committee of 12, with power to add; (3) to extend the date for applications as original members without entrance fee up to the end of July. The following are the names of the gentlemen elected to form the Committee, viz.:—Mr. Daniel Adamson, Mr. Julius Frith, Mr Henry N. Allott, Mr. Geo. Hughes, Mr. A. E. L. Chorlton, Mr. G. Layton, Mr. R. H. Clayton, Mr. Frank Nasmith, Mr. Wm. Cramp, Mr. S. L. Pearce, Dr. G. J. Fowler, Mr. J. H. Stubbs.

Educational Notes.—NORTHAMPTON POLYTECHNIC INSTITUTE, LONDON, E.C.—Full day courses in mechanical and electrical engineering, and courses in technical optics, commence on September 30th. For further particulars see our advertisement pages in this issue.

UNIVERSITY OF LONDON, KING'S COLLEGE.—Notice is given in our advertisement pages of a series of advanced lectures in engineering to be given next session. The following subjects will be dealt with:—(1) Internal-Combustion Engines, Petrol and Kerosene Engines; (2) Applications of Chemistry to Engineering; (3) Electrical Traction; (4) Irrigation; and (5) Design, Organisation and Operation of Central Electrical Stations.

An announcement is also made regarding courses of study in the Faculty of Engineering.

Legal.—CONDUITS FOR CANADA.—At the Birmingham Assizes last week, Mr. Justice Avory and a special jury heard the case of the Perfecta Seamless Steel Tube and Conduit Co., Ltd., *v.* Veritys, Ltd., in which plaintiffs sought to recover £345, the price of goods supplied. Defendants pleaded that the goods were not

delivered within the 14 days specified in the contract; that they were not in accordance with the specifications; and that they were not of a marketable quality and saleable in Canada. They counter-claimed £178 for expenses and loss of profit; £66 for loss of freight and insurance, and £104 for loss of profit. After a hearing extending over two days, his Lordship summed up. According to a report in the *Birmingham Daily Post*, he said that the only question for the jury was whether the goods supplied were in accordance with the contract of May 23rd, 1911. "He did not see any ground whatever for imputing to either of the parties any want of honesty. He saw no cause for imputing to the defendants that they were trying to get out of payment for that which they ought to have paid for, or, on the other hand, to the plaintiffs, that they had not put forward this claim in the perfectly honest belief that they were entitled to be paid for the goods. His Lordship quoted a letter written by the plaintiffs before the order was given, in which, whilst willing to guarantee the tubes as complying with the Canadian underwriters' specifications, and to submit the goods to inspection to satisfy the defendants as to that, they declined to undertake that the tubes should pass the inspection of any inspector of the Fire Underwriters' Board in Canada. The ground for this stipulation was stated as being that some of these inspectors represented American fire offices, and were biased in favour of American manufacturers. His Lordship went on to say that he did not think the defendants were entitled to reject the tubes on the ground that an American or Canadian inspector had refused to pass them. The fact that a Canadian inspector, who might be presumed to be honest, had refused to pass the tubes was evidence for their consideration, but it was evidence only, and could not in itself be conclusive of the rights of the parties in that case. The broad lines upon which the defendants appeared to object to paying for the tubes was that the enamelling was defective, and that the inside was not sufficiently smooth." The jury, after lengthy deliberation, were unable to agree, and they were discharged.

Appointments Vacant.—Assistant installation inspector, for the Shanghai Municipal Council (£25 per month); evening class teacher in electrical engineering at the Leeds Technical School; chief assistant engineer (£180) and draughtsman (55s.), for the Coventry Electric Tramways; assistant telegraph engineer, for the Federated Malay States Government (£360 and £75 duty allowance). See our advertisement pages to-day.

The Birmingham Electric Supply Committee, in its report to be presented to the City Council on July 30th, is recommending the appointment of an assistant to Mr. Chattock, as constructional engineer. The commencing salary is to be £400 per annum, rising to a maximum of £500 per annum at the discretion of the Committee.

The Dundee Meeting of the B.A.—According to Press announcements we gather that the following are among the matters that are to come before the meeting of the British Association, which opens at Dundee in the first week in September:—

Mr. B. P. Haigh, B.Sc., on "A New Machine for Alternating Load Tests."

Prof. Coker on "Optical and Electrical Methods of Determining the Stress Distribution in Springs and Other Bodies."

Prof. A. E. Kennelly on "Telephone Circuits."

Dr. T. F. Wall on "The Hysteresis Loss in Iron due to a combined Pulsating and Rotating Magnetic Field," the paper bearing on the subject of commutator motors.

Prof. E. Wilson on "Magnetic Hysteresis."

Mr. R. S. Whipple on a "New Coal Calorimeter."

It is also stated that Dr. J. A. Fleming will open a discussion on wireless telegraphy, and Messrs. Dugald Clerk and Holzwarth (of Mannheim) one on the gas turbine.

A Model Home.—Through the courtesy of the directors of Gidea Park, Ltd., we were recently enabled to inspect the model house which is on view at the Latin-British Exhibition, Shepherd's Bush, W. The house is a replica of a number which have been built at Gidea Park, near Romford. The rooms are furnished in the styles of different periods, and suitable electrical fittings have been supplied by Messrs. Veritys, Ltd. The dining and living rooms are illuminated by artistic candle fittings, the three bedrooms by two-light pendants and single bracket fittings, while in the hall are two ceiling lights.

We understand that there is at present no electric supply at Gidea Park, but powers are being sought by the company to erect a generating station to supply the estate, and to supply electricity to the town of Romford.

Copper.—Noticing a reduction in price of this metal, one naturally looks for increased supplies, and the figures in Messrs. Merton's mid-monthly circular in the present case bear out the theory. The stocks in England and France, and afloat from Chile and Australia on July 18th, stood at 43,339 tons, an increase of 1,746 tons over the quantity registered for June 29th. Of this 1,355 tons are at Havre, and a further 825 tons increase in Chile shipments outweighs the 200 tons decrease in Australian, and the withdrawals from English ports. Rotterdam has, however, dropped 550 tons, and Hamburg 249 tons, so that the change in quantities may be local. The American supplies showed a drop of 2,358 tons from the end of May to the end of June, and the world's supplies 5,353 tons for the same period. Turning to detailed supplies, we find North America to Europe considerably below average, Spain and Portugal also low, Chile well above, and Australia also high. Deliveries are unusually low, which may possibly be due to the modern conditions under which a surplus of willing hands results in no work being done.

OUR PERSONAL COLUMN.

The Editors invite electrical engineers, whether connected with the technical or the commercial side of the profession and industry, also electric tramway and railway officials, to keep readers of the ELECTRICAL REVIEW *posted as to their movements.*

Central Station Officials.—MR. R. S. JULL, late assistant engineer at Fareham, has taken up an appointment as station superintendent under the Chichester Electric Light and Power Co., Ltd.

The Mansfield Council has adopted the recommendation of the Committee that the salary of the engineer be increased from £275 to £300 per annum.

It is recommended by the Stepney Electricity Committee that MR. W. YOUNG be transferred to the official staff of the Council and appointed as resident electrical engineer at £275 per annum, rising in 12 months to £300, together with residence, coals, water and light at 27, Osborn Street.

MR. PLOWMAN, shift engineer to the Poplar undertaking, has been placed under the Scale V of the Council's grading scheme at a commencing salary of £150, rising by annual increments of £12 10s. to a maximum of £185 per annum.

The Hampstead B.C. has given consent enabling MR. COUZENS to act as consulting engineer to the West Ham Corporation for a period not exceeding six months.

Tramway Officials.—The Leith Council has resolved to increase the salary of its tramway manager by £50 this year, and by £25 per annum in each of the two succeeding years.

General.—On Friday evening, 19th inst., at the Criterion Restaurant, Devonport, a smoker and musical evening was held, at which a presentation was made to MR. F. O. TROTMAN, the mains and distribution supervisor of the electrical engineers' department of H.M. Dockyard, Devonport, in recognition of his marriage, which takes place to-morrow. Mr. P. J. Watts, the first assistant to the electrical engineer, presided, and tendered the best wishes of the chief electrical engineer, Mr. Z. H. Kingdon, who was unable to be present, and also of Mr. E. E. Benham, first assistant to the electrical engineer, who was unfortunately ill, and also of Mr. G. R. Battle, second assistant to the electrical engineer, who was also unable to be present. Mr. Watts referred appreciatively to the services of Mr. Trotman since he had been in the department, and wished him and his consort every happiness. Mr. Trotman suitably responded. The presents included a large silver tray (suitably inscribed), silver forks and spoons, silver-mounted pipe, and an autograph album containing the signatures of the subscribers

MR. ALFRED STILL, who left England in the early part of last year to take up the position of electrical engineer to the Lake Superior Power Co., of Sault-Ste-Marie, Ontario, Canada, has lately been appointed chief electrical engineer to the mining department of the Algoma Steel Corporation. His headquarters will be at Magpie Mine, Ontario, where he will have charge of the very complete and up-to-date electric power equipments at the various mines controlled by the company, and will also be responsible for the completion and operation of the 4,000-H.P. hydro-electric generating station connected to the mines through an 18-mile three-phase overhead transmission. Mr. Still is an Assoc.M.Inst.C.E., and a member of both the American and British Institutions of Electrical Engineers. He is the author of books on electrical engineering subjects, and a frequent contributor of technical articles to the electrical journals.

MR. JOHN MURRAY CRAWFORD, A.M.I.E.E., late of the Engineering Department of the British Post Office, has just sailed for Melbourne to take up the position of assistant electrical engineer in the Postmaster-General's Department, Commonwealth of Australia.

According to *Indian Engineering*, MR. M. G. SIMPSON, electrical engineer-in-chief, Telegraph Department, has left Simla for Calcutta

MR. R. R. G. MANN, A.C.G.I., has recently been appointed provisional telegraph officer in Southern Nigeria at a salary of £360 per annum, and he sails for West Africa on July 31st. After being 5½ years with the Eastern Telegraph Co., Mr. Mann spent a year at Finsbury Technical College and entered the City and Guilds (Engineering) College as a second-year student in 1910. At the close of the past session he was awarded the diploma of the College (A.C.G.I.) in electrical engineering.

Obituary.—The death is announced, at the age of 73 years, of MR. HENRY LEA, M.I.C.E., senior partner in the firm of Henry Lea & Son, Bennett's Hill, Birmingham.

HENRI POINCARE.—The lamented death of Prof. Poincaré, on July 17th, has removed from us one of the most eminent mathematicians of the age, whose influence, especially in France, where he was Professor of Mathematical Astronomy in the University of Paris, was very great. The original work which he accomplished is worthy to rank with that of Kelvin and Heaviside, and his investigations in connection with Hertzian waves and wireless telegraphy, as well as the electromagnetic theory of light and electrical oscillations in general, are of permanent value. His genius covered the whole range of mathematical physics, and his breadth of view, doubtless due in part to his early training as a mining engineer, enabled him to link together subjects of the widest dissimilarity. His age was only 58 years.

CITY NOTES.

Electric Construction Co., Ltd.

SIR IRVING COURTENAY (chairman) presided at Winchester House, E.C., on July 18th, over the nineteenth annual general meeting of the above company.

The CHAIRMAN first referred with regret to the death of Mr. W. S. B. McLaren, M.P., who was the chairman of the company for five years, and moved a vote of condolence with Mrs. McLaren, which was passed in silence.

In moving the adoption of the report (see ELECTRICAL REVIEW, page 64), the CHAIRMAN said the directors had done him the honour of electing him to the chair, and, while he had great hesitation in accepting office, he was influenced by the fact that they had a managing director who devoted his whole time to this company's business and its allied undertakings. He appreciated the honour highly, and no effort would be spared on his part to discharge efficiently the duties which devolved upon him. He had peculiar pleasure, on the first occasion of presiding at the general meeting, in presenting accounts which showed a net profit approaching that of their earlier years. Indeed, on comparing the results of last year with the past, he was somewhat surprised to find that the net profit earned exceeded some of the years when they distributed a larger dividend. After the protracted period of depression through which they had passed, however, the board felt that they were consulting the best interests of the company in providing liberally for reserves, and they therefore recommended the distribution of 3¾ per cent. on the ordinary shares, as compared with 2½ per cent. last year. As stated in the report, the works had been fully employed throughout the year (the number of machines produced again forming a record), and he was pleased to say that their products continued to enjoy their reputation for high-class design and workmanship. They were steadily increasing their exports to foreign markets, and the growing demand for electrical machinery at home warranted them in expecting a continuance of the enhanced profits earned during the past two years. Notwithstanding the general industrial unrest which had prevailed, the relations with the workmen continued to be of the most satisfactory character. Like everybody else they felt the result of the coal strike, but, having secured a good stock of fuel and raw material, they were able to keep the works going without cessation, although considerable inconvenience was suffered and extra expense incurred. With the view of economising the supply of fuel during the strike, the management at the works introduced what was known as the "one break system," and so satisfactory did this prove that it was decided to adopt it permanently. Under this system the works did not open until 7.30 a.m., the interval for breakfast being abolished. The total number of hours worked per week was now 50, as compared with 53 formerly, but careful investigation had shown that there had been no reduction in the amount of work produced, and there was little or no time lost through unpunctuality. The change was very popular with the workpeople, and he was satisfied that it would tend to confirm the feeling of contentment which was vital to the welfare of such a concern. The Insurance Act would involve a considerable increase in their standing charges, and whether, as alleged, they would receive a *quid pro quo* in increased efficiency, experience alone would prove. However, as behoved every good citizen, they would do all that they could to administer the Act in a proper spirit, recognising that its principles were sound and that anything that was done to ameliorate the conditions of the infirm or unemployed must be for the general good. Since the end of the financial year the board had redeemed £7,700 of the company's debenture stock. The stock redeemed would be kept alive (like the previous purchases) for the purpose of reissue, if required, but this they regarded as only a precautionary measure. The total amount of debenture stock outstanding was now £175,000, as compared with £250,000 three years ago. The gradual reduction of the company's indebtedness enhanced the value of the preference and ordinary shares, and it was the intention of the board, if opportunity offered to reduce still further the amount of debenture stock outstanding. Dealing with the accounts, there was really very little that he could say. All the items in the profit and loss account were strictly comparable with last year, the outstanding feature being an increase in income of £6,418, while the expenditure had only increased £1,095. This proved again what they had always said, that they looked to increased overturn for increased profits, seeing that a large volume of business could be handled without any material increase in expenses. The balance-sheet exemplified their strong financial position. The prudent and gradual realisation of the holdings in other companies had enabled them to discharge a good part of the debenture debt, and the attention to reserves had put them in possession of liquid investments which enabled them to view with equanimity any recurrence of the acute depression which prevailed a few years ago. Of such recurrence there was no indication at the moment. He would not attempt to prophesy, but he was entitled to say that the prospects for the new year were satisfactory, and they had every reason to hope they would come next year with a report as good as, if not better, than the one now presented.

SIR H. C. MANCE seconded the motion.

MR. BALL asked how the company's investments in the Madras Electric Tramways Co. and the Electrical Power Storage Co. now stood.

MR. JAS. GRAY (managing director) said the company's holding in the Madras Electric Tramways amounted at the date of the accounts to something like £17,500, but since the close of the accounts they had realised part of their holding. They were only interested in the 6 per cent. cumulative preference shares, but the company had paid 2 per cent. on its ordinary shares. Their holding in the Electrical Power Storage Co. was valued in the books at approximately £55,000. They had received no dividend from that concern for the past two years.

The report was adopted, and the retiring directors and auditors were re-elected.

MR. P. E. BEACHCROFT, on behalf of both the board and the shareholders, proposed a vote of thanks to the staff and employés of the company for their services during the year. He remarked that there were two essential qualifications for the success of a manufacturing company, viz., efficiency and good management, and the first was dependent on the second. They had a managing director who threw his whole heart into the work week in and week out, whilst under Mr. W. Bullock, their works manager, they had a technical staff which he considered second to none in the electrical industry of the country. They had also in Mr. Willock, their secretary, a man who not only devoted his energies to the secretarial work, but also went into the highways and byways and compelled orders to come in. Last, but not least, they had a bond of good feeling and harmony existing between employer and employé which in these days of industrial unrest was so essential for the successful carrying on of the business. He believed unless anything unforeseen happened, that the current year would be more successful than the past.

MR. JOHNSON, as a shareholder, seconded the motion, and said that having watched the progress of the company for the last 20 years, he was glad to see they had emerged from the dark days owing to successful management at both the offices and the works, and were now again in the forefront of the electrical industry.

The motion was carried and acknowledged by MR. J. GRAY, who said that the staff would continue to give their best services to the company with the knowledge that their efforts were appreciated.

Lanarkshire Tramways Co.

THE directors' report for the half-year ended June 30th, 1912, shows that the revenue was £37,101, and the expenses were £21,473, leaving £15,627, less contributions payable to local authorities, £822; interest on debentures, £904; interest account, £624 = £13,248, plus £1,385 brought forward, leaving a balance of £14,633, which is to be disposed of as follows:—£9,432 to dividend at the rate of 5½ per cent. per annum for the half-year on the issued capital, carrying £5,200 to revenue new account. The traffic receipts for the half-year show an increase of £568 and the expenses an increase of £2,113 as compared with the corresponding half-year of 1911. The traffic receipts were considerably affected by the coal strike, and it is estimated that but for the strike the takings would have shown a further increase of fully £2,500. The directors have arranged that in the event of the Lanark County Council obtaining powers to construct the uncompleted lines authorised by the 1903 Order, the County Council will construct the same and the company will work them, paying interest to the County Council on the amount of the cost of construction. The arrangement also provides for the County Council and other local authorities purchasing the company's undertaking at any time before 1928 at a price to be agreed upon with the company, but should this option not be exercised within two years from the opening of the new lines for public traffic the company will purchase the new lines from the County Council at cost price. The directors will, as usual, provide for depreciation in the accounts to December 31st next.

Prospectuses.—*The Egham and Staines Electricity Co., Ltd.*—The list was to close yesterday in an issue of 1,000 participating 5 per cent. cumulative preference shares, and 1,000 ordinary shares, all of £5 each offered at par, in all £10,000. A new station equipped with two Diesel engine sets of 100 KW. each, to the designs of Messrs. Handcock & Dykes, was completed in February last. The money is required for providing for the capital expenditure necessary to meet the growing demand.

Buenos Ayres Lacroze Tramways Co.—The list closes to-morrow (Saturday) in an issue of £500,000 5 per cent. consolidated mortgage debentures. The expansion of the business renders further works necessary, and the proceeds of the issue will go to the purchase of rolling stock, additional car-sheds and repair shops, extensions, and other improvements.

Metropolitan Railway Co.—The directors announce, subject to final audit, a dividend upon the ordinary stock for the past half-year at the rate of 1½ per cent. per annum, carrying forward £4,500 to the next half-year's account, and placing £7,500 aside for electrical renewal and depreciation.

Great Northern and City Railway Co.—The report of the directors, according to the *Times*, is very satisfactory, as, for the first time for several years, the company is able to pay the full dividend on its debenture stock without any outside help, and to carry a small balance forward. The number of passengers carried shows an increase of 532,716, and the receipts an increase of £2,613. The expenses show an increase of £1,140; the largest item is under "locomotive generating power," in which there is an increase of £897 for coal.

Central London Railway Co.—The directors announce dividends at a rate of 3 per cent. per annum on the ordinary stock, at the rate of 4 per cent. per annum on the preference stock, and at the rate of 2 per cent. per annum on the deferred stock, leaving £23,776 to be carried forward. The dividends a year ago were at the same rates, and the carry forward was £30,655.

Brush Electrical Engineering Co., Ltd.

MR. E. GARCKE, chairman, presided on Monday at the offices of the Electrical Federation, 1, Kingsway, W.C., over the annual general meeting of the above company.

The CHAIRMAN, in moving the adoption of the report (see ELECTRICAL REVIEW, page 104), said he had had the honour of appearing as chairman of the company in three successive years. When he first took the chairmanship, in 1909, he did so in the expectation that it would be only for a year or two, for the purpose of assisting to carry out a much-needed rearrangement of capital. He was sorry, however, that the delay in bringing about this desirable change had been greater than he anticipated, but the progress towards a better state of things, although slow, had, nevertheless, been very clear and definite. For 1909, their gross profits were just under £20,000; for 1910, they were over £28,000, and last year (1911) they were £35,500, and the standing charges, which were very materially reduced three years ago, had only gone up by about 4 per cent., although the gross profits had very nearly doubled. Four years ago, the directors had to record a loss on working for the year of close on £40,000. The following year the loss was about £20,000. Last year they reported a loss of £10,800, and this year they showed a loss of £5,688. They had, therefore, made steady progress during the past four years, although of a negative kind. If they continued their progress in this way, there was reasonable hope that the accounts for the current year would, at any rate, show an equilibrium between profits and expenses, including all debenture interest and other charges. The directors, therefore, considered that the present time was opportune for carrying out the long-delayed reorganisation of the capital account, and the accounts had been made up with the view to showing what, in the opinion of the directors, should be the reduction of capital. Whenever this matter had been mentioned at previous meetings the view had been expressed by the shareholders that the reduction of capital when made should be drastic, so as to avoid the necessity of the operation being repeated. He hoped shareholders would agree that the writing down which the directors proposed, or that they indicated, was as drastic and as complete as was practicable. To do more than they proposed would, they thought, be asking the shareholders to make an unnecessary sacrifice. The company had in the past been confronted by many difficulties, and it had weathered many storms, and he had recollections of the company having enjoyed periods of prosperity, and saw no reason whatever why shareholders should not look forward to the company enjoying some measure of prosperity again; at any rate, it was the duty of all concerned to combine in the endeavour to carry the company through its present difficulties with a view to its again becoming prosperous. They proposed to carry out a reduction of capital so as to place the balance-sheet on a proper footing, and to write off the accumulated losses of the past years, in order that the profits which they hoped to make in future years might be available for distribution as dividend to the shareholders, and simultaneously they proposed to raise a little further capital, so as to discharge the outstanding loans and to provide some working capital. They had raised some temporary loans and had given a second prior lien charge as security, but these loans and this charge would be merged or disposed of in some way in the new arrangement. The problem of raising fresh capital was not an easy one, and, in order that they might be able to submit a scheme to them with a prospect of their being able to accept it, they suggested that a committee of shareholders and debenture-holders should be appointed in order to confer with the directors on the scheme, which they were prepared to submit to and discuss with such Committee. They had invited shareholders who were willing to serve on the Committee to communicate with them, and they proposed to ask the shareholders to appoint as a Committee all the gentlemen who had expressed their willingness to serve. This would make rather a large Committee, but, having asked gentlemen to come forward, it would be better that all should be appointed rather than that they should discriminate between them. They were Messrs. F. J. Marchmont (solicitor), Wm. Parker (representing several trust companies), Wm. Geipel (electrical engineer), J. J. Bisgood (manager of Edinburgh Life Office), Gerard H. Perryn (civil engineer), R. V. Greene, J. G. Lorrain (engineer and patent agent), and C. H. Dade (manager of the British Electric Traction Co.), with Mr. J. B. Braithwaite (of Messrs. Foster & Braithwaite) and Mr. J. Cecil Bull to represent the debenture-holders. In 1911 the benefit of reviving trade was felt generally in the engineering industry. Better business, however, brought with it the usual accompaniments of labour troubles. The railway strike in August, 1911, had effects altogether disproportionate to the period of its duration. Other local strikes followed, and in the spring of the present year the coal strike and a general strike of steel moulders in the Sheffield district were severely felt. One of the results of these strikes was that in many branches, and particularly in the iron and steel industries, the various works were much behind with deliveries, and it was very difficult to carry out time contracts. The moral of this was that buyers should in their own interests endeavour to place their orders well ahead of the actual requirements whenever possible, instead of, as was too often the case, leaving them over until the machinery was urgently wanted. He was glad to say that there were signs that buyers were beginning to realise the importance of doing this, and they had lately booked orders for delivery as far forward as in the latter part of next year. He was pleased to say also that the prices of steam and electrical machinery were stiffening somewhat, although they were still far below what was required to give the manufacturer a reasonable return—having regard to the highly skilled character of the work and the unavoidable risks of the business. Prices of commodities were going up all round. Coal was 2s. to 3s. per ton higher, and other raw and partially finished materials showed advances. All manufacturers of electrical machinery would have to follow suit, because their profit margins were already so narrow that they would not be able to stand anything in the way of increased cost. On the other hand, they must not forget that increased prices would strengthen the competition from abroad, so long as they admitted the manufactured imports free of duty. In the report, reference was made to the great advance in popularity of the steam turbine. This advance had been so marked that the turbine now practically held the field where large generating units were required. They had now been building turbines for a good many years, and had latterly had more orders than they could conveniently deal with, having regard to the abnormal conditions which he had already explained. They furnished these turbine sets, not only for central power stations, but also for many industrial applications, and they had them in successful operation so far away as Japan, New Zealand, South America, and South Africa. The demand for plant of this description appeared likely to increase, and they were very desirous of being able to take full advantage of the favourable position they occupied as makers of turbine machinery. On the rolling stock side, they had an improved turnover in 1911, and he was glad to report that the orders in hand, and in prospect, were satisfactory. They had executed, and had in hand, important contracts for main-line passenger and freight rolling stock for Brazil, Siam, Egypt, and Chile, and had just been successful in securing an order for coaches for the Central London Tube Railway. Tramcar orders in 1911 were not good, but there had been an improvement during the present year, and they were now fairly busy in that department. They were also building motor-omnibus bodies for all the leading companies, including the London General Omnibus Co., the Tramways (M.E.T.) Omnibus Co., the Central Omnibus Co., British Automobile Traction Co., and this was a branch of business in which they looked for an increasing demand. He could speak to them at great length on the general condition of the electrical industry in this country; on the legislative obstacles which had been placed in the way of its development; on the frequent recurrence of labour troubles; on the absurd encouragement of competition from abroad, with consequent reduction of profit leading to still keener competition among the home manufacturers. He might also say something about the ever-increasing rates and taxes, but he would only have to repeat what had been already stated on former occasions. All they could do was to continue to the best of their abilities along the path of their duty in the full conviction that improvement in the conditions must follow, and while they were grateful to the shareholders for the patience they had shown, they hoped that an early improvement in the position would reward them for their forbearance, and diminish some of the anxieties and troubles which directors and officers carrying on an electrical manufacturing concern in this country experienced.

MR. W. L. MADGEN seconded the motion.

MR. BUSH pointed out that the gross profits were £35,000 odd, which seemed very small, considering the large capital the company had. He did not know what the percentage of gross profit was, but he assumed, in a manufacturing business like theirs, they would want 25 to 35 per cent., which would give a turnover of £150,000. But even with a turnover of £200,000, the amount of gross profit was ridiculously small with the capital of the company. He saw the chairman smiling, which probably meant that their turnover was much greater, but if so it was obvious that they must do the work at very low prices and probably some at a loss. He suggested that the directors might consider the inadvisability of taking so much work if they were doing it at a loss, and considered the shareholders should be told what relationship the gross profit bore to the turnover. The chairman had given no details of the suggested re-organisation of capital, and it appeared to him that what was really required was a re-organisation of management. He failed to see how the re-organisation of capital could give them bigger profits; what they wanted was more profitable business.

The CHAIRMAN said the turnover was much greater than that mentioned by Mr. Bush, whilst the profits were very much smaller than they considered reasonable. Their complaint was that the profits were so small owing to the reduction in prices over which they had no control. The prices for the commodities were determined by competition which was very keen. They were opposed to the competition of powerful manufacturers abroad who had protection in their home market and who were able to dump their goods into this country at a low price. It was true that the foreign importation was not so big as it was because the low prices had made the business unprofitable, but the moment they put up prices they would bring in foreign goods again. They were doing a large volume of business, and the management was most careful, but the margin of profit was very small. They were bound to take a large volume of business to cover standing charges.

MR. ABBOTT remarked that the most prosperous time the company had was when they had a profit-sharing scheme with the employés, and he suggested that the directors might consider the advisability of re-establishing such a scheme.

MR. CATHCART thought they stood a chance of the ordinary capital being further wiped out by reconstruction. It seemed to him that £19,000 for administrative expenses was very high, whilst £4,250 for advertising and London expenses appeared very large.

The CHAIRMAN said advertising expenses were higher that year, owing to their having taken a stand at the Olympia Exhibition Still, if they did not advertise, they could not attract the business they required, and they did not spend more on advertising than other firms. He admitted that the expenses seemed high in comparison to the profits, but if they could once increase the rate of

profit, then all the figures would assume their right proportions. He was afraid that employés would not appreciate a profit-sharing scheme when there were no profits, but the board would consider the question, although it was not an easy one.

Mr. R. V. Greene withdrew his name from the suggested Committee, in view of the number who were prepared to serve, and remarked that it did not seem fair that the British Electric Traction Co. should have such voting power as to have practical control of the company. It seemed to him that they would be liable to a reduction of capital in respect of the prior lien bonds issued some years ago.

The Chairman said the scheme was by no means cut and dried, and he thought it better to refrain from mentioning what was in the minds of the directors until they met the committee, when they could thoroughly discuss the whole matter. Afterwards the shareholders would have an opportunity of expressing their views. He did not quite know what Mr. Greene meant by his reference to the British Electric Traction Co. That company were large shareholders, but they were no more.

Mr. Greene said what he meant was that if the whole of the other shareholders were of one mind, they would not have sufficient voting power to equal that of the British Electric Traction Co.

The Chairman said the B.E.T. Co. had never exercised their voting power to the detriment of the company. In fact, there had never been any dissension amongst the shareholders. They were all in the same boat, and had to work together. So far from the shareholders having been prejudiced by the association of the B.E.T. Co., it was entirely due to the assistance of that company that the position of the Brush Co. was not worse than it was.

Replying to Mr. Roberts, the Chairman said the British Electric Traction Co. held some of the first prior lien bonds, which they took up when they were offered by the company, and they also held the whole of the second prior lien bonds, against the advance made by them during the year.

The report was then adopted, and the retiring directors were re-elected.

Mr. Bisgood said he wanted it to be understood that he was going on the Commiteee simply as a private shareholder. The Edinburgh Life Co. had no interest whatever in the company.

Crompton & Co., Ltd.

The twenty-fourth annual general meeting was held on Monday at Salisbury House, London Wall, E.C., Mr. John Trotter presiding.

The Chairman, in proposing the adoption of the report (see Electrical Review, page 105), said that when he addressed them on the last occasion low prices and the depressed condition of the electrical manufacturing industry had produced a state of affairs in the company which gave them all cause to take a depressing view of the situation, and whilst they did not now consider the results which had been obtained in the past year by any means satisfactory, still he thought they had turned the corner, and that they were entitled to take a more optimistic view of the future. A few words might not be amiss in explanation of the fluctuations which had appeared in the results of the company. For a good many years past the competition in the electrical trade had been very keen, and there had been a good deal of cutting of prices. In those circumstances, to make profits it was necessary that the manufactory should be kept well supplied with orders. With that end in view, a considerable amount of contract work was done by the company, which in turn brought business to the company's works. In 1909 the contract work fell off, and that coinciding with a scarcity of orders at the works, resulted in a serious diminution in the gross profits, which in the year ended March, 1910-11, and the first half of the year under review, were not sufficient to cover expenses. In order to do the extensive turnover, which reached its maximum in the year ending March, 1908, the directors made temporary arrangements for a loan from the company's bankers until such time as further capital could be arranged. Subsequent depression made the idea of raising further capital out of the question, and the board were compelled to restrict the company's business in certain directions in order to permit of the bank loan being reduced. This restriction, which was more particularly in the direction of refusing to take on any business which would tend to lock up the company's capital, coming at a time when orders on more satisfactory terms were few and far between, resulted in many orders being taken during that period at a price which left but little margin for standing charges. Those standing charges were reduced somewhat, but a heavier loss still would have been incurred had the selling staff been further reduced, as the output at the works would obviously have dropped away still more. Some of the business which was taken a year or more ago, when orders were difficult to obtain, was completed in the first half of the year under review, but such business brought little or nothing in the way of profit to go against standing charges, and that accounted for the bad results obtained in the first half of the year. It was very satisfactory to be able to say that they had come to the end of the orders taken under such conditions. The demand for goods of the company's manufacture was steadily improving. That improvement was shown in the fact that in the second half of the year the results were so much better, and he was glad to say that, in one department, where the want of orders was most severely felt, they had, during the first quarter of the current year, secured business to a value of 40 per cent. in excess of the orders secured in the corresponding period of last year. The sales of machines covered by the C.M.B. patents continued to be satisfactory. It might interest shareholders to know that, so far as they had been able to ascertain, the company's selling prices were, generally speaking, about the average of those ruling in the trade. In some particular sizes of machines, that did not quite suit their standards, their price came out above the average, but in other cases their prices were fairly low, and the increase in the orders received during the last few months was pretty good evidence that the company's prices were about right. With regard to foreign and Colonial business, the directors would of course like to see the business abroad increased. In one or two directions openings presented themselves at the present time, but in the more important markets a certain amount of stock was required to be held, and much as they would like to cultivate such markets, the directors did not feel justified at present with the company's limited working capital in embarking on such business. At the last meeting he told them that there were two contracts in dispute. He was glad to say that in one case the dispute had been settled satisfactorily in the company's favour without litigation. The other case involved a dispute with the Government of India, and the matter was not likely to be cleared up for another 12 months. He was glad to say that the company's relations with their customers were excellent, and during a year when there had been labour disputes on every hand, it was satisfactory to be able to report that their relations with their workmen were all that might be desired. He might say that the Insurance Act would probably cost them between £800 and £1,000 a year. Turning to the balance-sheet, the short term notes which appeared on the liability side of the account at £9,375 had been reduced by £3,900 since March 31st. Sundry creditors had been reduced by £2,000 during the year, and the bank loan by £4,000, and they were within a few months of seeing a further considerable decrease in the bank loan. On the other side of the account, plant, tools, &c., were reduced by £2,271, due to the usual writing off. Trade debtors amounted to £105,555, as against £125,819. That reduction was satisfactory, as showing that the policy which was indicated last year of concentrating business and not taking orders which would tend unduly to lock up capital, had had its effect. In regard to the Electric Supply Corporation, it was satisfactory to find that the shares of that concern which they had had to hold for so many years, had at last paid a dividend and began to show signs of life. In the profit and loss account there was an increase of £1,200 in trading expenses due to the increased turnover. On the other hand, there was a decrease of £1,850 in administration due to economies effected in many directions. The gross profit showed an improvement of over 33⅓, or £11,000. There still remained the disagreeable fact that there was a loss to revenue account of £1,500, but that compared with a loss of £14,000 last year. He had great hopes that on the next occasion they would be able to show much better results. In the last six months they had covered the debenture interest and other charges against revenue, and the same position of things was being maintained up to the present, and had it not been for the first six months they would not have had to show any further increase in the debit balance, which was now £58,000, as against £48,000 last year.

Col. Clibborn seconded the motion.

The Chairman, in reply to questions, said that there would be various ways eventually of dealing with the company's finances, and amalgamation might be one of them. He did not, however, think the present was an opportune time to talk about amalgamation, because obviously things were on the mend, and they would get a very much better price a little while ahead than if they attempted to amalgamate with anybody at the present time.

The report was adopted.

Austrian Manufacturing Companies.

The report of the *Austrian Siemens-Schuckert Works, of Vienna*, states that a considerable increase in the orders took place in 1911. The works were employed to the full extent of their capacity, and extensions became necessary. Owing, however, to the prevalence of keen competition, it was difficult to obtain satisfactory sale prices. After placing £58,000 to depreciation, the accounts show net profits of £75,000, as compared with £56,000 in 1910, and a dividend of 6 per cent. has been declared, being the same rate as in the previous year. The favourable degree of activity has continued in the present year, and work is on hand for a long time forward.

The *Ver. Gluhlampen und Elektrizitats Gesellschaft, of Neupest*, reports that the departments for telephony and railway safety appliances were abundantly provided with work in 1911, and the existing orders will also assure uniformly good employment in the present year. On the other hand, a further decrease in orders was experienced by the carbon-filament lamp factory through the extended use of wire lamps. The wire lamp factory was enlarged, and the capacity of production was doubled. After allocating £14,000 to depreciation, the accounts exhibit net profits of £42,000 for 1911, as contrasted with £35,000 in the preceding year. It is proposed to pay a dividend of 10½ per cent., as compared with 9 per cent. in 1910.

Metropolitan District Railway Co.—The directors, after setting aside £10,000 as reserve for renewals, recommend a dividend on the 4 per cent. guaranteed stock for the past six months, at the rate of 4 per cent. per annum, a dividend on the first preference stock for the six months at the rate of 4½ per cent. per annum, and a dividend on the second preference stock for the six months at the rate of 2 cent. per annum, as against no payment in the corresponding period of last year. The carry-forward is £6,300.

Insurance Amalgamation.—It is announced, says the *Times*, that a provisional agreement has been entered into for the acquisition by the Royal Insurance Co. of the shares of the British Engine, Boiler, and Electrical Insurance Co., of Manchester.

City and South London Railway Co.

THE fifty-sixth ordinary general meeting of this company was held on Tuesday at the offices, 71, Finsbury Pavement, E.C., the Right Hon. C. B. Stuart Wortley, K.C., M.P., presiding.

The CHAIRMAN, in proposing the adoption of the report (see ELECTRICAL REVIEW, page 107), said he did not think they would expect him to take up much time in confessing or explaining that this half-year was, and was sure to be, a very different half-year to that which they had to discuss a year ago. The events of that half-year were unusual, they produced financial results that were unusual, and they had to recommend unusual measures for dealing with those results. In all the circumstances they might well be glad of the foresight that was showed last year, by reason of which they stood to-day a good deal better than without it they would have done. Gross receipts were down by the large sum of £5,947. But that adverse fact was neutralised by the fact that the expenses had been kept down, and showed a net decrease of £153. The result was that the balance to net revenue was down by £5,794. That situation was mitigated to the extent of £1,827 by the facts that they brought forward from the December, 1911, account, £1,027 more than they did from December, 1910, and that they passed to renewal account £1,500 this year as of old, instead of the £2,300 that they thought it well to put to that account last year, when they had some very exceptional incomings to deal with. Charges for interest were less by £612, and this added to the £1,827, reduced by £2,439 the decrease on net revenue, and gave them a sum available for dividends of £32,694, against the record sum of £36,049 that they had last year. They had, however, to pay more by £949 than they had last year in dividend on 1903 preference, with the final result that for dividend on the ordinary stock they had less by £4,304 than in July, 1911. Paying 10s. per cent. less dividend on the ordinary stock would save £3,700, and if they agreed to this proposal, it enabled them to recommend a final carry-over reduced by no more than £604 from the unusually large sum of £2,798 that they carried forward 12 months ago. Compared with what might have been expected, this result might well have been worse. The June receipts of 1911 were swollen by the extraordinary traffic of the Coronation period, and there were no strikes in that half-year. The June half-year of 1912 had seen two strikes, one of which raised the price of fuel, and both of which interfered with the employment of the classes from which their passengers were drawn, and reduced their spending power alike on journeys to and from work and on excursions in search of pleasure. Then, again, the national game of cricket seemed to some extent to be losing popularity as an attraction to spectators. The matches at the Oval were not attended by the multitudes whose fares were formerly so beneficial to their gross receipts. The number of passengers carried was only 12,510,728, against 13,318,622 in the Coronation half-year, but was nevertheless greater than in any other June half-year in their history. It was too soon to say whether they had got to the worst of the omnibus competition. So long as their tramway rivals had not the direct access which they had to the heart of the City at the Bank, it seemed that there must remain a large and perhaps a growing class of people to whom their service was indispensable, and whose patronage nothing could take away from them so long as they could hold their own in the matter of speed. It had been made known to them already that this important matter of speed was occupying their practical attention; and he might go so far now as to say that improved speed seemed assured to them as a matter of mechanical possibility, and that its realisation was only a question of finance. A new subway had been built to give access from their own Moorgate Street Station to those of the Metropolitan and the Great Northern and City lines. The policy of this subway was that of keeping their customer underground when they had got him—of giving him facilities for continuing his journey without coming to the surface and there encountering temptations not addressed to him in the interest of underground railways. Their relations with their wage-earning staff continued to be as good as they could wish. They had henceforward to provide some £500 a year as employer's pence under the Health and the Unemployment portions of the National Insurance Act. It certainly seemed strange that contributions for insurance against unemployment should have to be taken from either masters or men in the case of employment which was so little casual or precarious as employment under a railway company. It was an employment which, subject only to good behaviour, a man enjoyed in practical permanence. They had, indeed, men now in their employment who had been with them for no less than 22 years, the whole period the undertaking had existed. He said something last January about his own desire that something should happen to them that might remove some of the bad effects of competition, and make them partners in some cases where now they were rivals and antagonists. They had doubtless seen that the speculating public had chosen to assume that that something was much more imminent than it really was. They formed that opinion not, as he believed, in consequence of what he said, but as an inference from considerations which were of the same sort as those which he had in mind when he spoke. Those considerations were really the public property of all observant men. All he could say was that his colleagues and he remained of the same mind now as then, and that he had nothing either to add or to take away from what he then said on that point. He could not report any newly-arisen prospect, but he could say that nothing had happened to close any door or make their position or prospects otherwise worse.

MR. SEYMOUR GRENFELL seconded the motion.

MR. WHITE criticised the management of the line and deprecated the expenditure that had been made upon extensions.

COL. PERRY said he was in favour of still further extensions if the line was to hold its own. He would like to see a branch leading direct from Victoria to the Oval.

MR. HIGHTON urged the directors to do what they could to give an improved service and expressed the hope that when the question of accelerating the speed of the trains was taken into consideration the board would use less powerful engines, which would enable them to run lighter trains in the middle of the day.

The CHAIRMAN, in reply, said the directors certainly did not contemplate any extension to Victoria. With regard to running lighter trains, their difficulty was that they had not the facilities for breaking up the trains, and they had satisfied themselves that it was more economical to continue the present practice rather than acquire ground for giving them those facilities.

The report was adopted.

Stock Exchange Notices.—Applications have been made to the Committee to appoint a special settling day in and to grant a quotation to—

Babcock & Wilcox, Ltd.—Further issue of 830,000 ordinary shares of £1 each fully paid.

And to allow the following securities to be quoted in the Official List:—

Georgia Light, Power and Railways.—$2,280,000 first lien 5 per cent. 30-year gold bonds of $1,000 each (Nos. 1 to 2,280), and 60,000 common shares of $100 each fully paid.

The Committee have appointed special settling days as under:—

Thursday, August 1st.—Shawinigan Water and Power Co.—Further issue of $1,000,000 capital stock, in shares of $100 each.

And ordered the under-mentioned securities to be quoted in the Official List:—

Metropolitan Railway Co.—Further issue of £729,706 consolidated stock, and £25,000 3½ per cent. convertible preference stock.

Shawinigan Water and Power Co.—Further issue of $1,000,000 capital stock in shares of $100 each; and a further issue of £205,480 4½ per cent. perpetual consolidated mortgage debenture stock.

Metropolitan Electric Tramways, Ltd.—A circular has been issued by the secretary relating to a scheme for consolidating the ordinary and deferred shares. The board proposes the conversion of the issued deferred shares into ordinary shares on the basis of one fully-paid ordinary share of £1 for four fully-paid deferred shares of £1 each, such new ordinary shares to be entitled to dividend from January 1st next, but in all other respects to rank *pari passu* with the existing ordinary shares. It is stated that the average market prices of the ordinary and deferred shares for the past year were 18s. 6d. and 3s. 6d. respectively. The proposal involves the reduction of the company's issued capital to the extent of 15s. in respect of each of the issued 314,016 deferred shares, representing £235,512, to which extent the capital of the company is unrepresented by available assets. It is also proposed to cancel the 185,984 deferred shares which have never been issued. Meetings of the shareholders to consider the scheme have been called for to-day, July 26th.

The German South American Cable.—The ordinary share capital of the Deutsch-Sudamerikanische Telegraphen Gesellschaft, of Cologne, is to be increased by £125,000 to £625,000 for the purpose of defraying part of the expenditure for extending the company's cable from Monrovia *via* Togo to the Cameroons, whilst the remainder is to be raised by the issue of a loan of £192,000. A financial group headed by the Schaaffhausen Bank Verein is to take over the shares at par, and offer them to existing shareholders at the price of 105 per cent. The concession for the extension has already been granted, and the cable working agreement with the Imperial Post Office authorities, which is generally based upon the same financial principles as that for the Borkum-Teneriffe-Monrovia-Pernambuco connection, is on the point of being completed.

Vickers, Ltd.—The directors have declared interim dividends for the half-year to June 30th of 2½ per cent. (less income-tax) on the preferred 5 per cent. stock and 5 per cent. preference shares, and 1s. per share (free of income-tax) on the ordinary shares.

Dublin United Tramways Co. (1896), Ltd.—The directors report that the amount available for division is £57,829, out of which it is recommended that dividends be paid for the half-year at the rate of 6 per cent. per annum, less income-tax, on both the preference and ordinary shares. £10,000 is to be set aside towards the renewal of permanent way, and £1,000 to accident insurance reserve. £11,234 is to be carried forward.

Liverpool Overhead Railway Co.—The accounts for the half-year ended June 30th last, show an available balance of £13,528, and the directors have resolved to recommend the payment of dividends at the rate of 5 per cent. per annum on the preference shares and 2 per cent. per annum on the ordinary shares, leaving £4,852 to be carried forward.

County of London Electric Supply Co., Ltd.—The directors have declared an interim dividend on the preference shares at the rate of 6 per cent. per annum, and an interim dividend on the ordinary shares at the rate of 4 per cent. per annum, both for the half-year ended June and both less income-tax.

City of London Electric Lighting Co., Ltd.—The directors have declared an interim dividend at the rate of 6 per cent. per annum (6s. per share), less income-tax, on the ordinary shares for the past half-year.

ELECTRIC TRAMWAY AND RAILWAY TRAFFIC RETURNS.

Locality.	Fortnight ended.	Receipts for the fortnight.		No. of wks.	Total to date.		Route miles open.	
		£	£*		£	£*		Inc.
Aberdeen	July 17	3,427	+ 109	7	10,864	— 326	14·4	..
Ayr	„ 20	1,660	+ 99	9	4,156	+ 194	8	..
†Bath	„ 13	1,103	+ 78	28	23,937	+ 1,500	..	..
Birkenhead	„ 21	2,400	— 33	15	18,484	— 610	13·68	..
Birmingham Corp.	„ 14	21,570	+3,332	15	158,756	+43,577	57·17	..
Blackburn	„ 17	2,661	+ 197	16½	19,888	+ 816	14·62	..
†Blackpool Corp.	„ 11	2,663	+ 554	..	21 064	+ 3,216	11·87	..
Blackpool-Fleetw'd	„ 20	2,601	+ 13	2	3,997	— 177	8	..
Bournemouth	„ 17	4 020	+ 142	15⅔	28,542	+ 816	21·95	..
Bradford	„ 18	11,732	+ 251	15	83,142	— 1,256	56	1·2
Brighton	„ 21	2,954	— 40	16	16,654	— 495	9·5	..
Bristol	„ 19	15,622	+ 1,326	..	194,090	+ 16,745	30·5	..
Brit. Elec. Trac. Co.								
Airdrie	„ 12	669	+ 218	28	8,173	+ 2,105	3·65	..
Barnsley	„ 12	401	+ 43	„	4,723	— 289	..	..
Barrow	„ 12	956	+ 213	„	10,096	+ 2,472	5·37	..
Devonport	„ 12	1,103	— 17	„	14,895	+ 1,891	8·85	..
Gateshead	„ 12	2,182	— 13	„	28,414	— 95	11·25	..
Gravesend	„ 12	407	— 85	„	5,684	— 39	6·5	..
Greenock	„ 12	1,712	+ 76	„	21,508	+ 2,482	7·25	..
Hartlepool	„ 12	532	— 130	„	6,933	— 66	6·72	..
Kidderminster	„ 12	302	+ 10	„	3,084	+ 95	..	..
‡Leamington	„ 12	515	+ 68	„	4,825	+ 387	..	..
Merthyr	„ 12	418	— 51	„	5,346	— 362	2·9	..
Metropolitan	„ 12	18,896	—1,308	„	245, 81	+ 6,155	23	..
Middleton	„ 12	783	+ 13	„	9,180	— 66	8·5	..
Mid. Joint Com'tee	„ 12	6,766	+ 431	„	88,184	+ 3,540	..	..
Oldham—Ashton	„ 12	1,367	+ 111	„	16,862	+ 1,265	9·18	..
Peterborough	„ 12	511	+ 20	„	3,512	+ 267	5·31	..
Potteries	„ 12	4,880	+ 328	„	51,665	— 2,024	29	..
Rothesay	„ 12	983	+ 9	„	4,187	+ 91	2·75	..
Southport	„ 12	789	— 21	„	7,999	— 92	8·17	..
S. Metropolitan	„ 12	1,911	— 218	„	23,297	+ 83	..	..
Swansea	„ 12	2,447	— 61	„	30,901	— 55	12·5	..
Tynemouth	„ 12	686	— 96	„	6,949	— 274	3·75	..
Weston-s-Mare	„ 12	565	— 145	„	2,605	— 420	8	..
‡Worcester	„ 12	659	— 8	„	7,766	— 83	5·75	..
Wrexham	„ 13	259	+ 37	„	3,033	+ 307	..	..
Yorks. Wool. Dist.	„ 12	2,395	+ 217	„	29,855	+ 1,064	17	..
Miscellaneous	„ 12	505	+ 20	„	6,252	+ 216	..	..
Burnley	„ 20	2,946	+ 261	..	..	..	11·78	..
†Burton-on-Trent	„ 14	297	+ 5	15	3,961	— 241	6·6	..
Bury	„ 21	2,783	+ 130	16	21,501	+ 315	22·5	..
Cardiff	„ 18	5,153	— 430	15	55,849	— 2,789	17·35	..
Chatham and Dist.	„ 18	1,887	+ 5	29	24,582	+ 188	14·98	..
Cork	„ 18	1,145	— 49	29	13,875	— 311	9·89	..
Croydon	„ 12	3,862	— 149	15	28,248	— 245	11·6	·75
†Darlington	„ 20	257	— 6	16	3,598	+ 62	4·87	..
Darwen	„ 19	579	+ 45	16	4,581	+ 113	4·26	..
Dover	„ 13	577	— 14	15	3,653	— 221	4·75	..
Dublin	„ 19	13,248	—5,195	..	17,657	— 6,885	54·25	..
East Ham	„ 10	2,218	— 34	16	47,104	— 294	7·87	..
Exeter	„ 19	719	— 80	16	5,506	— 285	5·5	..
Glasgow	„ 20	31,138	— 962	..	134,884	— 4,628	98	·25
Hastings	„ 18	2,482	— 29	..	..	— 1,087	19·3	..
Huddersfield	„ 20	4,361	+ 345	16	32,569	+ 729	29·5	·5
Hull	„ 20	5,976	+ 189	16	45 914	— 315	53·5	—1
†Ilkeston	„ 18	137	+ 6	16	1,598	— 60	..	..
†Ipswich	„ 13	528	+ 20	15	6,702	+ 78	10·5	..
†Kilmarnock	„ 18	174	— 28	8	1,408	— 49	4·25	..
Lancashire United	„ 17	3,178	+ 250	29	37,852	— 89	89	..
Leeds	„ 10	16.832	+ 810	16	126,212	+ 527	112·7	..
†Leicester	„ 18	2,828	+ 168	..	..	..	20	..
Leith	„ 10	1,764	+ 9	9⅝	7,009	+ 177	8·72	..
Liverpool	„ 18	25,781	+ 626	27½	330,665	+ 11,014	116	..
‡L.C.C.	„ 10	87,146	—6,660	..	688,688	—15,686	140·6	..
London United	„ 20	14,795	—1,097	..	181,928	— 6,598	..	..
Lowestoft	„ 20	607	+ 58	42	6,861	— 344	8·5	..
Manchester	„ 20	35,458	+2,206	16	272,335	+10,956	105	..
Newcastle	„ 20	8,788	+ 318	..	70,765	+ 495	31·3	..
†Newport	„ 6	738	— 12	14	9,618	— 497	7·25	..
Oldham	„ 21	4.418	+ 280	17	35,277	+ 926	28	..
Pontypridd	„ 20	810	— 87	16	5,818	— 1,006	5·5	..
Portsmouth	„ 18	5,505	+ 507	15	33,257	— 2,175	15·75	..
Preston	„ 17	1,711	+ 108	16	18,060	+ 336	10	..
Rotherham	„ 17	1,583	+ 210	15⅔	11,021	+ 580	12	..
Salford	„ 12	10 388	+ 449	16½	83,846	+ 2,668	41	..
†Sheffield	„ 13	6 669	+ 251	..	111,523	+ 2,907	40	..
Southampton	„ 17	2 814	+ 63	15	19,729	+ 400	11	..
Southend-on-Sea	„ 17	2,040	+ 326	16	12 231	+ 1,062	7	..
South Shields	„ 20	1,356	+ 3	16	10,060	— 98	10·25	..
Tyneside	„ 17	1,063	— 25	3	1,257	— 196	11	..
Wallasey	„ 10	2,553	+ 122	15⅔	18,202	— 331	8·72	..
Walthamstow	„ 20	1,738	+ 43	16	12,940	+ 112	9	..
West Ham	„ 11	5 928	— 498	14⅓	39,640	— 1,170	16·25	1
Wolverhampton	„ 17	2,307	+ 102	16	16,057	+ 142	13·75	..
Cen. London Rly.	„ 20	8 888	— 1,188	3	12,778	— 1,846	6·32	..
City & S. Lon. Rly.	„ 21	5 658	— 669	3	8,611	— 807	7·26	..
Dublin-Lucan Rly.	„ 19	344	— 14	3	448	— 71	7	..
G.N. and City Rly.	„ 20	2,780	+ 41	3	4,259	+ 102	3·5	..
L'pool Overh'd Rly.	„ 21	3,417	+ 200	..	5,104	+ 260	6·6	..
Llandudno-Col. Bay	„ 19	1,029	— 82	33⅓	7,653	+ 306	6·5	..
Lond. Elec. Ry. Co.	„ 20	24,9 5	— 595	3	38,375	— 6,298	21·25	..
Mersey Railway	„ 20	4.071	+ 167	3	5,948	+ 223	4·5	..
Metropolitan Rly.	„ 21	34.766	+ 231	3	52,679	+ 254	35·75	..
Met. District Rly.	„ 20	24 390	+ 933	3	37,389	+ 1,518	25	..
Anglo-Argentine	„ 15	98,960	+ 2,706	..	1,480,152	+ 52 041	..	..
§Auckland	June 28	16,189	+ 1,662	..	227,976	+ 18,822	23·81	..
Bombay (B.E.T.)	„ 21	3,860	+ 240	25	75,410	+ 4,475	..	..
§Brisbane	..	..	..	..	..	..	..	..
Brit. Columbia Rly.	..	..	..	..	..	..	..	..
Calcutta	July 23	8,019	+ 346	..	..	..	..	..
Cape Electric T.Ld.	..	..	..	..	..	..	..	..
§Kalgoorlie, W.A.	June	8,151	..	6	18,657	..	20·5	..
§Lisbon	..	..	..	..	..	..	..	..
Madras	July 15	1.681	+ 145	..	21,458	+ 2,502	13·5	·75
§Montevideo	June	56 59	+4.639	8	288,422	+34.176	..	..
Perth (W.A.)	July 5	3 557	+ 539	..	50,458	+ 7,071	29	..

* Compared with the corresponding period of 1911. † One week only.
‡ Includes horse, steam and other receipts. § One month.

STOCKS AND SHARES.

Tuesday Afternoon.

THE principal factor in Stock Exchange markets since last we wrote has been continued and acute flatness of Consols. This has begun to react on most of the gilt-edged markets, spreading to Debenture stocks and the like, incidentally bringing down prices of bank shares. The Home Railway market, in addition, has to endure with what grace it may the poor dividend declarations as well as the labour trouble, but amongst Latin-Canadian issues there is pronounced activity.

It is somewhat astonishing, perhaps, but none the less true, that in these summer days, when most Stock Exchange firms are complaining of the want of business, a few engaged in the foreign traction market are so busy that their staffs are working up to midnight almost without intermission, and have been so for many weeks past.

The English electricity supply department has fallen upon its summer somnolence. City of London Electric Ordinary, however, provide an exception to the prevailing quietude. On a recurrence of the former buying, the price added another £1 last Saturday, jumping to 20, though this invited profit-takers, and the quotation slipped back to its former level of 19. Counties are also a shade easier at 11⅜ middle. The interim dividend is at the rate of 4 per cent. A small issue by the Egham and Staines Company attracted little attention in the market.

Some of the electric lighting companies are, despite the time of year, extremely busy in those departments where the new Insurance Bill makes itself felt. It is said that the mere mention of Section 2 in certain of these offices is sufficient to cause a smart rise in the temperature.

Home Railways, on the whole, are fairly steady, so far as the electrical companies are concerned. City and South London rallied 1½ after its long fall. Metropolitans gained ½, and Districts ¾. At least part of the recent heavy fall in Metropolitans is thought to be due to the re-marketing of part of the £750,000 stock which the company sold a little while ago. At the time, the issue was absorbed with apparent ease, but it is now evident that, at all events, some of the recent buying of "Mets." was of the ragged order, and the weak bull element does not seem to be eliminated entirely from the market even yet. The dividend at the rate of 1½ per cent., against 2 per cent. a year ago, is considered poor. Central London Deferred shed 2 points on sales by some who had expected a better dividend declaration, and the announcement of the Underground Electric Railways also caused some disappointment, although the stocks of the latter company have not suffered. London Electric Railways 4 per cent. Debenture eased off a little, and District prior lien is a point down. London United Tramways Preference shares have recovered substantially, the price rising 7s. 6d. to 5½. Metropolitan Electric Tramways have been strong, but the Ordinary slipped back ⅜, upon digestion of the scheme which has been put forward for reorganisation of the capital. The Deferred shares, after touching 5s. 6d., lost 1s., but the Preference shares keep steady, at 18s. 3d. Buying of the British Electric Traction issues has this week been noticeable mostly in the 7 per cent. Preferred stock, which shows a rise of 3. There is no alteration in Brush stocks. Monday's meeting elicited a cautiously hopeful speech from the chairman.

Notwithstanding the volume of trade in Latin-Canadians, the actual price changes are comparatively slight. Mexico Trams have gone back 1½, but Mexican Light and Power Common are unaltered. Rio Trams, where there is an enormous amount of business going on, have lost the three points which they picked up last week, and Sao Paulo, at 263½, is four points lower, some criticism having been directed to the arrangement for amalgamating these two with the Sao Paulo Electric Company. British Columbia Electric Railway stocks are a trifle easier. The Indian group keeps very firm. A few movements of ¼ to ½ have occurred amongst the various bond issues, rises and falls being distributed pretty equally.

Marconi's, after being 5¾ bid, slipped back to 5¼, from which there was a recovery to 5½. The market now is a good deal at the mercy of two speculative groups, which are pulling in opposite directions. National Telephone Deferred is for the time being a somewhat dull market, results being awaited from the arbitration proceedings. The Third Preference shares have fallen ½. They are to be paid off on July 31st, at par, without prejudice to whatever other rights they may be adjudged to possess. West India and Panama Telegraphs again dwindled, but Anglo-American Deferred, at 25⅞, is up ¼, American Telephone and Telegraph capital stock also being a little better. Eastern Extensions have recovered part of their dividend, and a 10s. rise in Great Northerns took the price to 28½. Reuters are not so good, easing off to 11⅝.

Henley's continue to be in request, and show a rise of ¼; Callender's Preference fell ⅛. Electric Construction Ordinary shed $\frac{1}{16}$, the fraction being picked up by the Preference. Inquiries for British Westinghouse 4 per cent. Debenture have been persistent, and the price is 2 higher. British Aluminium 5 per cent. Debenture went back 1½ after its recent steady improvement. Babcock and Wilcox are also duller, the selling coming apparently from the North of England and from Scotland, while Dick, Kerrs, at ⅛, are about 2s. down. General Electrics maintain their good rise, and the new Preference shares are ¼ premium, this being one of the few recent new issues to be materially over-subscribed.

SHARE LIST OF ELECTRICAL COMPANIES.

ENGLISH ELECTRICITY SUPPLY AND POWER COMPANIES.

NAME.	Stock or Share.	Dividends for 1910.	Dividends for 1911.	Closing Quotations July 23rd.	Rise + or Fall —	Present Yield p.c. £ s. d.
Bournemouth & Poole, Ord. ..	10	5⅛	5⅛	9⅞ — 10⅜	..	5 2 4
Do. 4½ % Pref.	10	4½	4½	9 — 10	..	4 10 0
Do. Second 6 % Pref. ..	10	6	6	10¾ — 11	..	5 9 1
Do. 4½ % Deb. Stock	Stock	4½	4½	98 —100	..	4 10 0
Brompton & Kensington, Ord...	5	10	10†	8⅞ — 8⅞	..	5 12 8
Do. 7 % Cum. Pref.	5	7	7	7⅞ — 8⅛	..	4 6 2
Central Electric Supply, 4 % Guar. Deb.	100	4	4	97 —100	..	4 0 0
Charing Cross, West End & City	5	5	5	4⅛ — 5	..	5 0 0
Do. 4½ % Cum. Pref.	5	4½	4½	4⅛ — 4⅜	..	4 17 4
Do. "City Undertaking" 4½ % Cum. Pref.	5	4½	4½	8⅜ — 4⅛	..	5 6 0
Do. Do. 4 % Deb... ..	100	4	4	94 — 96	..	4 3 4
Chelsea, Ord.	5	5	5	4⅜ — 4⅝	..	5 2 7
Do. 4½ % Deb.	Stock	4½	4½	97 —100	..	4 10 0
City of London, Ord.	10	7	8	18½ — 20	..	4 0 0
Do. 6 % Cum. Pref.	10	6	6	14½ — 16½	..	3 12 9
Do. 5 % Deb.	Stock	5	5	118 —122	..	4 2 0
Do. 4½ % Second Deb. ..	100	4½	4½	99 —102	..	4 8 3
County of London, Ord... ..	10	5	6	11⅛ — 11⅝	— ⅛	5 3 3
Do. 6 % Pref.	10	6	6	11½ — 12	..	5 0 0
Do. 4½ % Deb.	Stock	4½	4½	106 —108	..	4 3 4
Do. 4½ % Second Deb. ..	Stock	4½	4½	100 —103	..	4 8 3
Edmundson's, Ord.	5	Nil	Nil	7/16 — 11/16	..	Nil
Do. 6 % Cum. Pref.	5	Nil	Nil	3— 3½	..	Nil
Do. 4½ % First Mort. Deb. ..	100	4½	4½	84 — 87 xd	..	5 3 6
Folkestone	5	6	6	4⅜ — 5½	..	5 14 3
Do. 5 % Cum. Pref.	5	5	5	4⅜ — 5½	..	4 15 3
Do. 4½ % First Deb.	100	4½	4½	94 — 97	..	4 12 9
Hove	5	9	9	7½ — 8	..	5 12 6

NAME.	Stock or Share.	Dividends for 1910.	Dividends for 1911.	Closing Quotations July 23rd.	Rise + or Fall —	Present Yield p.c. £ s. d.
Kensington & Knightsbridge, Ord	5	9	9	7½ — 7¾	..	5 16 2
Do. 4 % Deb.	Stock	4	4	93 — 95	..	4 4 3
Kent Elec. Power, 4½ % Deb. ..	Stock	4½	4½	78 — 82 xd	..	5 9 9
London Electric, Ord.	3	2	2½	1⅞ — 1⅞	..	4 0 8
Do. 6 % Pref.	5	6	6	5 — 5½	..	5 9 1
Do. 4 % First Mort. Deb. ..	Stock	4	4	90 — 93	..	4 6 0
Metropolitan	5	5	4	3½ — 4	..	6 1 3
Do. 4½ % Cum. Pref... ..	5	4½	4½	4¼ — 4⅜	..	4 17 4
Do. 4½ % First Mort. Deb. ..	Stock	4½	4½	99 —102	..	4 8 3
Do. 3½ % Mort. Deb... ..	Stock	3½	3½	85½ — 87½	..	4 0 0
Midland Electric Corporation 4½ % First Mort. Deb.	100	4½	4½	97⅞ — 99½	..	4 10 6
Newcastle-on-Tyne 5 % Pref., Non-Cum.	5	5	5	4½ — 5	..	5 0 0
North Metropolitan Power Supply, 5 % Mortgages (Red.)	100	5	5	100 —103	..	4 17 1
Notting Hill, 6 % Non-Cum. Pref.	10	..	6	10 — 11	..	5 9 1
Oxford	5	7¼	7¼	5⅞ — 6⅜	..	5 13 9
St. James' and Pall Mall, Ord.	5	10	10	8 — 8⅞	..	5 14 3
Do. 7 % Pref.	5	7	7	6⅞ — 7⅜	..	4 15 0
Do. 3½ % Deb.	100	3½	3½	82 — 85	..	4 2 4
Smithfield Markets, Ord. ..	5	Nil	2	1⅜ — 1⅞	..	..
South London, Ord.	4	5	5	3 — 3½	..	5 14 3
Do. 5 % First Mort. Deb. ..	100	5	5	98 —101	..	4 19 0
South Metropolitan, 7 % Pref...	1	7	7	1 3/16 — 1 5/16	..	6 1 0
Do. 4½ % First Deb. Stock ..	100	4½	4½	97 — 100	..	4 10 0
Urban, Ord...	£3	5	..	1/16 — 3/16	..	..
Do. 5 % Cum. Pref.	5	5	2	2½ — 3	..	3 6 8
Do. 4½ % First Mort. Deb. ..	100	4½	4½	86½ — 88½	..	5 1 8
Westminster, Ord, ...	5	10	10	8¼ — 8⅜	..	5 14 3
Do. 4½ % Cum. Pref... ..	5	4½	4½	5 — 5⅛	..	4 3 9

COLONIAL AND FOREIGN ELECTRICITY SUPPLY AND POWER.

Adelaide, 6 % Pref.	5	6	6	5⅜ — 5⅞	..	5 2 2
Calcutta, Ord.	5	8½	8½	7⅜ — 7⅞	..	5 8 0
Do. 5 % Pref.	5	5	5	5 — 5¼	..	4 15 3
Calgary Power, 1st Mort. Bds.	100	5	5	96— 98	+ ½	5 2 0
Canadian Gen. El. Com. ..	$100	7	7†	114 —119	..	5 17 8
Do. 7 % Pref.	$100	7	7	120 —124	..	5 13 0
Cordoba Lt., Power and T., Ord.	1	3	3†	1/16 — 1/8	..	3 4 0
Do. 5 % Deb.	100	5	..	94 — 97	..	5 3 1
Elec. Lt. and P. of Cochabamba, 6 % Bonds	100	6	6	91 — 93	..	6 9 0
Elec. Supply Victoria, 5 % 1st Mort. Deb.	100	5	5	81 — 84	..	5 19 1
Elec. Dev. Ontario, 5 % 1st Mort. Bonds	$500	5	5	95½ — 97½	+ 1	5 2 7
Kalgoorlie Elec. P. and L., Ord.	10/-	Nil	..	1/8 — 1/4	..	Nil
Do. 6 % Pref.	1	6	6	13/16 — 2 3/16	..	8 6 0
Kaministiquia Power, 5 % G. Bs.	$500	5	5	104 —106	..	4 14 4
Madras, Ord.	5	..	..	1 7/16 — 2 3/16	..	..
Melbourne, 5 % 1st Mort. Deb.	100	5	5	102 —105	..	4 15 3
Mexican El. Lt., 5 % 1st M. Bds.	..	5	5	89 — 91	— ½	5 10 0
Mexican Lt. & Power, Common	$100	4	4	94 — 97 xd	..	4 2 6
Do. 7 % Cum. Pref.	$100	7	7	108 —111	+1	6 6 2
Do 5 % 1st Mort. Gold Bds.	..	5	5	99 —101	—1	4 19 0
Monterey Rly. Light & Power, 5 % 1st Mort. Deb.	100	5	5	88 — 90 xd	..	5 11 1
Montreal, Lt., H. and Power ..	$100	7	8	235 —245	..	3 5 4
Northern, Lt., Power and Coal, 5 % 1st Mort. Bonds	$500	5	5	39 — 42	..	11 18 2
River Plate, Ord.	Stock	10	10	240 —250	..	4 0 0
Do. 6 % Non-Cum. Pref. ..	Do.	6	6	109 —114	..	5 5 3
Do. 5 % Deb. Stock	Do.	5	5	101 —103	..	4 17 1
Roy. Elec. Co., Montreal, 4½ % 1st Mort. Deb.	100	4½	4½	99 —101	..	4 9 1
Shawinigan Water, Capital ..	$100	4	5†	152 —157 xd	..	3 3 8
Do. 5 % Con. 1st Mort. Bonds	$500	5	5	108 —110	..	4 11 0
Do. 4½ % Per. Deb.	Stock	4½	4½	104 —106	..	4 5 0
Toronto Power, 4½ % Deb. ..	Do.	4½	4½	99 —101	..	4 9 1
Vera Cruz Lt., P. and T., 5 % 1st Mort. Deb.	100	5	5	90½ — 92½	..	5 8 1
Victoria Falls Power, Pref. ..	1	Nil	11¾d.	7/16 — 1/2	..	..
West Kootenay Power and Lt., 1st Mort. 6 % Gold	100	6	6	105½ — 107½	..	5 11 7

TELEGRAPH AND TELEPHONE COMPANIES.

Amazon Telegraph	10	Nil	4†	7⅛ — 7⅜	..	5 3 3
Do. 5 % Deb. Red.	Stock	5	5	96½ — 98½	..	5 1 6
American Telep. & Teleg., Cap.	$100	8	8†	148 —150	+ ½	5 6 8
Do. Collat. Trust	$1000	4	4	94 — 96	..	4 3 4
Anglo-American Telegraph ..	Stock	8½	8	65½ — 67½	..	4 9 0
Do. 6 % Pref.	Do.	6	6	111⅝ — 112½	..	5 6 6
Do. Def...	Do.	80/-	80/-	25⅜ — 26⅛	+ ⅛	5 14 10
Anglo-Portuguese Tel., 5 % Mort. Deb.	100	5	5	102½ — 104½	..	4 16 2
Chili Telephone	5	7	..	7⅛ — 7⅜ xd	..	4 10 4
Commercial Cable, Stlg. 4% Deb.	Stock	4	4	82 — 84	..	4 15 3
Cuba Telegraph	10	6	6†	9½ — 10½	..	5 14 3
Do. 10 % Pref...	10	10	10	16½ — 17½	..	5 14 3
Direct Spanish Telegraph, Ord.	5	4	4†	3½ — 3⅝	..	5 6 8
Do. 10 % Cum. Pref... ..	5	10	10	7 — 7⅜	..	6 9 0
Direct United States Cable ..	10	4½	5	7⅜ — 7⅝	..	6 7 0
Direct W. India Cable, 4½ % Reg. Deb.	100	4½	4½	98 —100	..	4 10 0
Eastern Telegraph, Ord. Stock	Stock	7	5†	128 —131 xd	..	5 6 10
Do. 3½ % Pref. Stock.. ..	Do.	3½	3½	77½ — 79½	+ ½	4 8 1
Do. 4 % Mort. Deb.	Do.	4	4	98½ —100½	..	3 19 7
Eastern Extension	10	7	5†	12 1/16 — 13 1/16 xd	+ ⅛	5 5 8
Do. 4 % Deb.	Stock	4	4	99 —101	..	3 19 3
East and S. Africa Tel. 4 % Mt. Db. Mauritius Sub.	25	4	4	97 —100	..	4 0 0
Globe Telegraph and Trust ..	10	5⅞	6†	10⅜ — 11½	..	5 6 8
Do. 6 % Pref.	10	6	6	12⅝ — 13⅜	..	4 11 5
Great Northern Telegraph ..	10	18	18	27¼ — 28¾	+ ½	6 5 2
Indo-European Telegraph ..	25	13	5†	56 — 58	..	6 3 5
Mackay Companies Common ..	$100	5	5	90 — 94	..	5 6 5
Do. 4 % Cum. Pref.	$100	4	4	70 — 73	..	5 9 7
Marconi's Wireless Telegraph	1	5	20	5 5/16 — 5 7/16	— 1/16	3 13 6
Do. 7 % Cum. Partic. Pref.	1	16	17	4⅜ — 4⅝	— 1/16	8 9 8
Monte Video Telephone, Ord. ..	1	6	6	1 — 1⅛	..	5 6 8
Do. 5 % Pref.	1	5	5	⅜ — ⅝	..	5 14 3
National Telephone, Pref. ..	Stock	6	6	101½ — 104½	..	..
Do. Def.	Do.	6	6	143 —145	—2	..
Do. 5 % Non-cum. 3rd Pref.	5	5	5	5 1/16 — 6 3/16	— ⅛	..
New York Telep., 4½% Gen. Bnds.	100	4½	4½	99⅛ — 100½	+ ½	4 9 7
Oriental Telep. and Elec. ..	1	8	8	1 13/16 — 1 15/16	..	4 13 0
Do. 6 % Cum. Pref.	1	6	6	1 1/16 — 1 3/16	..	5 1 1
Do. 4 % Red. Deb.	Stock	4	4	88 — 90	..	4 9 0
Pacific and European Tel., 4 % Guar. Debs.	Do.	4	4	98 —100	..	3 18 5
Reuter's	8	5	5†	11 — 11½	— ½	3 9 7
Submarine Cables Trust ..	Cert.	6	6	127 —130	..	4 12 4
Telephone Co. of Egypt, 4½ % Deb. Red.	Stock	4½	4½	99 —101	..	4 9 1
United River Plate Telephone	5	8	8	7 9/16 — 7 11/16	+ 1/16	5 2 5
Do. 5 % Cum. Pref.	5	5	5	5⅛ — 5⅜	..	4 11 0
West Coast of America	2½	2½	2½	1 5/16 — 1 7/16	..	4 0 0
Do. 4 % Debs., 1 to 1,500 guar. by Braz. Sub. Tel.	100	4	4	96 — 99	..	4 0 10
West India and Panama Teleg.	10	1½	½	2⅛ — 2⅜	— 1/16	1 16 4
Do. 6 % Cum. 1st Pref. ..	10	6	6	10⅛ — 10⅜	..	5 11 7
Do. 6 % Cum. 2nd Pref. ..	10	6	6	9⅜ — 10⅛	..	5 17 1
Do. 5 % Debs.	100	5	5	100⅛ — 102⅛	..	4 17 7
Western Telegraph, Ltd. ..	10	7	6†	18 — 18⅜	..	5 3 8
Do. 4 % Deb.	Stock	4	4	96 — 98	..	4 1 8
Western Union 4½ % Fdg. Bonds	$1000	4½	4½	100 —103	..	4 7 5

* Unless otherwise stated, all shares are fully paid. † Interim dividend.

Continued on next page.

SHARE LIST OF ELECTRICAL COMPANIES.—(*Continued.*)

ELECTRIC RAILWAYS AND TRAMWAYS.—HOME.

NAME.	Stock or Share.	Dividends for 1910.	Dividends for 1911.	Closing Quotations July 23rd.	Rise + or Fall —	Present Yield p.c. £ s. d.
	*					
Bath Trams, Pref. Ord.	1	Nil	Nil	7/32 — 11/32	..	Nil
Do. 5 % Pref.	1	5	5	7/16 — 1/2	..	6 8 1
Do. 4½ % Deb.	100	4½	4½	78 — 83	..	5 8 5
Brit. Elec. Trac., 6 % Pref.	100	..	..	11 — 13	..	..
Do. Do. Deferred	100	..	..	6 — 8	..	..
Do. Do. 6 % Cum. Pr'f.	100	..	6	90 — 93	..	6 9 0
Do. 7 % Non-Cum. Pr'f.	100	..	..	42 — 45	+2½	..
Do. 5 % Perp. Deb.	100	5	5	95 — 99	..	5 1 0
Do. 4½ % 2nd Deb.	100	4½	4½	80 — 84	..	5 7 2
Central London Railway, Ord.	100	8	8	74 — 76	..	3 19 0
Do. Pref.	100	4	4	81 — 83	..	4 16 5
Do. Def.	100	2	2	73 — 75	—2	2 13 4
Do. 4 % Deb.	100	4	4	99 —101	—1	3 19 3
City & South London, Ord.	100	1⅛	1⅛	34½ — 35½	+1½	4 11 7
Do. 5 % Pref., 1891	100	5	5	108 —110	..	4 11 0
Do. Do. 1896	100	5	5	104 —106	..	4 15 3
Do. Do. 1901	100	5	5	104 —106	..	4 14 4
Do. Do. 1903	100	5	5	103 —105	..	4 15 3
Do. 4 % Deb.	100	4	4	99 —101	..	3 19 3
Dublin United Trams, 6 % Pref.	10	6	6	10⅜ — 11⅜	..	5 2 2
Great Northern & City, Pr'f. Ord	10	Nil	..	1⅜ — 2	..	Nil
Hastings Trams, 6 % Pref.	5	Nil	6	3/8 — 3/4	..	8 0 0
Do. 4½ % Deb.	100	4½	4½	71 — 76	..	5 18 5
Isle of Thanet Trams, 5 % Pref.	5	2½	2½	2½ — 2¾	..	4 11 0
Do. 4 % Deb.	100	4	4	78 — 78	..	5 2 7
Lancashire United, 5 % Deb.	100	5	5	81 — 83	..	6 0 6
London Elec. Railw'ys, 4 % Deb.	100	4	4	94 — 96	—1	4 3 4
London United Trams, 5 % Pref.	10	Nil	..	5½ — 5¾	+ 1/8	..
Do. 4 % Deb.	100	4	4	73 — 77	— ½	5 4 0
Metropolitan Railway Consol.	100	1⅜	1⅞	54½ — 55	+ ½	3 8 2
Do. Surplus Lands	100	2⅜	2⅝	67 — 69	..	4 3 4
Do. 3½ % Deb.	100	3½	3½	86 — 88xd	—1	3 16 11
Do. 3½ % Pref.	100	3½	3½	86 — 88	..	3 19 7
Do. 3½ % Con. Pref.	100	3½	3½	86 — 88	..	3 18 8
Metropolitan District Ord.	100	Nil	Nil	38½ — 39	+ 1/2	Nil
Do. 6 % Deb.	100	6	6	141 —143	..	4 4 0
Do. 4 % Deb.	100	4	4	94 — 96	..	4 3 4
Do. 4 % Prior Lien	100	4	4	98 —100	—1	4 0 0
Do. 4½ % First Pref.	100	3⅞	4½	90 — 92	..	4 17 10
Do. 3½ % Gtd.	100	3½	3½	76 — 78	..	4 9 9
Metropolitan Elec. Trams, Ord.	1	5/8	6	1 — 1⅛	— 3/32	5 6 8
Do. Def.	1	Nil	..	1/32 — 3/32	..	Nil
Do. 5 % Pref.	1	5	5	7/32 — 9/32	..	5 4 2
Do. 4½ % Deb.	100	4½	4½	96 — 98	..	4 11 10
Do. 5 % Deb.	100	5	5	98 —100	..	5 0 0
Potteries, Ord.	1	2	..	1/32 — 1/16	..	..
Do. 5 % Pref.	1	5	5	7/16 — 1/2	..	6 13 4
Do. 4½ % Deb.	100	4½	4½	87 — 90	..	5 0 0
South Metro. Trams, 6 % Pref.	1	6	..	1/16 — 1/8	..	7 7 8
Do. 4 % Deb.	100	4	4	70 — 75	..	5 6 8
Underground Elec. Railways	10	..	..	4½ — 4⅝	..	Nil
Do. "A"	1/-	..	..	3/8 — 1/2	..	..
Do. 4½ % Bonds	100	4½	4½	99 —101	+1	4 9 1
Do. 6 % Income	100	1	1½†	88 — 90	..	..
Yorkshire (West Riding), Ord.	5	Nil	..	1/2 — 3/4	..	Nil
Do. 6 % Pref.	5	Nil	3	2⅞ — 3⅛	..	4 9 0
Do. 4½ % Deb.	100	4½	4½	78 — 82	..	5 9 9

ELECTRICAL RAILWAYS AND TRAMWAYS.—COLONIAL AND FOREIGN.

Anglo-Arg. Trams, 1st Pref.	5	5	5⅛	5 3/8 — 5 7/16	..	5 1 2
Do. 2nd Pref.	5	5	5⅛	4 15/16 — 5 1/16	..	5 6 0
Do. 4 % Deb.	100	4	4	94½ — 96	..	4 3 4
Do. 4½ % Deb.	100	4½	4½	99½ —101½	..	4 8 8
Do. 5 % Deb.	100	5	5	101 —103	..	4 16 2
Auckland Trams, 5 % Deb.	100	5	5	102 —104	..	4 14 4
Bombay Elec. S. & Trams, Pref.	10	6	6	11½ — 12½	..	4 18 0
Do. 4½ % Deb.	100	4½	4½	96 — 98	..	4 11 10
Do. 5 % 2nd Deb.	100	5	5	97 — 99	+ ½	5 1 0
Brisbane Trams Invt., Ord.	5	8	8	7 — 7⅛	..	5 6 8
Do. 5 % Pref.	5	5	5	4⅞ — 5⅛	..	4 15 3
Do. 4½ % Deb.	100	4½	4½	99 —102	..	4 8 3
B. Columbia Elec. Rly., Def.	100	8	8†	135 —140	—1	5 14 4
Do. Pref. Ord.	100	6	6	117 —122	—1	4 18 4
Do. 5 % Pref.	100	5	5	105½ —108½ xd	— ½	4 12 2
Do. 4½ % 1st Mort. Deb.	40	4½	4½	99½ —102½	..	4 7 10
Do. 4½ % Vancouver Deb.	100	4½	4½	103 —105 xd	..	4 5 9
Do. 4½ % Con. Deb.	100	4½	4½	102½ —104½	..	4 6 2
Calcutta Trams, Ord.	5	6	7	6⅜ — 6⅝	..	5 5 8
Do. 5 % Pref.	5	5	5	4¾ — 5⅛	..	4 17 7
Do. 4½ % Deb.	100	4½	4½	99 —102	..	4 8 3
Cape Electric Trams	1	Nil	2½†	3/8 — 1/2	..	..
City Buenos Aires Trams (1904)	5	5	5	5 3/16 — 5 5/16	..	4 10 6
Do. 4 % Deb.	100	5	5	99 —102	..	4 18 0
Colombo Elec. Tr. & Lt., 5 % Deb.	100	5	5	94 — 98	..	5 2 0
Havana Elec. Rly., 5 % Bonds	£1000	5	5	99 —103 xd	..	4 17 1
Kalgoorlie Elec. Trams	1	Nil	..	3/16 — 5/16	..	Nil
Do. 5 % A Deb.	100	5	5	86 — 91	..	5 10 0
Do. 6 % B Deb.	100	5	3	35½ — 43½ xd	..	6 18 0
La Plata Elec. Trms, Ord.	1	..	..	3/32 — 3/4	..	..
Do. Pref.	1	6	6	3/32 — 1/2	..	6 0 0
Lisbon Elec. Trams, Ord.	1	5½	6	1 — 1½	..	4 8 0
Do. 6 % Pref.	1	6	6	1 — 1¼	..	4 16 0
Do. 5 % Deb.	100	5	5	93 — 97	..	5 3 1
Madras Elec. Tr. (1904), Deb.	100	5	5	100 — 102	..	4 18 0
Manaos Trams & Lt., 1st Deb.	100	5	5	89 — 93	..	5 8 8
Manila Elec. R. and Ltg., Bonds	£1000	5	5	103 —105	..	4 15 2
Mexico Trams Com.	$100	7	7	123 —126 xd	—1½	5 11 1
Do. Gen. Con. 5 % Bonds	..	5	5	100 —102	..	4 18 0
Do. 6 % Bonds	100	6	6	102½ —104½	..	5 14 10
Para Elec. Rlys. & Lt., Ord.	5	10	10	7⅞ — 7⅞	..	6 11 2
Do. 6 % Pref.	5	6	6	5 — 5⅛	..	7 0 4
Do. 5 % 1st Deb.	100	5	5	100 —102	..	4 18 0
Perth (W.A.) Elec. Tr., Ord.	1	2½	..	1 3/16 — 1 5/16	..	1 18 4
Do. 5 % 1st. Deb.	100	5	5	99 —102	..	4 18 0
Rangoon El. Tr. & Sup., Pref.	5	6	6	5¼ — 5⅜	..	5 4 4
Do. 4½ % 1st Deb.	100	4½	4½	97 — 99	..	4 11 0
Rio de Janeiro Trams	$100	4½	5†	152 —155 xd	—3	3 5 9
Do. 1st Mort. 5 % Bonds	..	5	5	103 —104	— ¼	4 16 2
Do. 5 % Mort. Bonds	100	5	5	99½ —100½	..	4 19 3
Sao Paulo Tram, Lt. and P.	$100	10	10†	261 —266	—4	3 15 2
Do. 5 % 1st Deb.	$500	5	5	106 —108	..	4 12 7
Singapore Trams, 5 % Deb.	100	5	5	82½ — 85½	..	5 17 0
Southern El. Tr. B.A., 5 % Deb.	100	5	5	98 —100	+1	5 0 0
Un. Elec. Trams Monte Video	5	6	7	5⅜ — 5⅝	..	5 19 2
Do. 6 % Pref.	5	6	6	4⅝ — 5⅛	..	5 11 7
Do. 5 % 1st Deb.	100	5	5	100 —103	..	4 17 1
Winnipeg Elec. Rly., 4½ % Deb.	100	4½	4½	104½ —106½	..	4 4 6

MANUFACTURING COMPANIES.

Aron, Ord.	1	Nil	6	3/8 — 3/4	..	8 0 0
Do. 6 % Pref.	1	9	6	7/32 — 11/32	..	7 7 8
Babcock & Wilcox	1	26	28	2⅜ — 3⅜	— 3/16	4 9 7
Do. Pref.	1	6	6	1⅜ — 1⅝	..	4 0 0
British Aluminium, Ord.	1	..	..	1/2 — 17/32	..	..
Do. 6 % Cum. Pref.	1	..	..	3/4 — 7/8	..	..
Do. 5 % Prior Lien Debs.	100	5	5	93 — 96	..	5 4 2
Do. Deb. Stk.	100	5	5	84 — 88	—1/2	5 13 8
B.I. & Helsby Cables	5	10	10	7⅞ — 8⅛	..	6 1 3
Do. Pref.	5	6	6	6¼ — 6⅜	..	4 9 0
Do. Deb.	100	4½	4½	101 —103	..	4 7 5
British Thomson-Houston, Deb.	100	4½	4½	96 — 98	..	4 11 10
British Westinghouse, Pref.	8	Nil	..	7/16 — 1/2	..	Nil
Do. Deb.	100	4	4	59 — 62	+2	6 9 1
Do. 6 % Prior Lien	100	6	6	102 —105	..	5 14 8
Browett, Lindley, Ord.	1	Nil	..	2/- —3/-	..	Nil
Do. Pref.	1	Nil	..	4/6 —5/-	..	Nil
Brush, 7 % Pref.	2	Nil	..	0 — ¼	..	Nil
Do. 5 % Prior Lien Deb.	100	5	5	75 — 80	..	6 5 0
Do. 4½ % Deb.	100	4½	4½	52 — 57	..	7 17 10
Do. 4½ % Second Deb.	100	4½	4½	35 — 40	..	11 5 0
Callender's Cable	5	15	10†	10⅜ — 11⅛	..	6 13 4
Do. Pref.	5	5	5	4⅜ — 5	— ⅛	5 0 0
Do. Deb.	100	4½	4½	98½ —100½	..	4 9 6
Castner-Kellner	1	17½	20	3⅝ — 3⅞	..	5 6 8
Do. Deb.	100	4½	4½	104 —108	..	4 10 7
Crompton & Co.	8	Nil	Nil	3/4 — 7/8	..	Nil
Do. Deb.	100	5	5	56 — 66	..	7 11 6
Dick, Kerr	1	5	5	3/4 — 7/8	— 3/32	5 14 3
Do. Pref.	1	6	6	1 — 1⅛	..	5 6 8
Do. Deb.	100	4½	4½	95 — 98	..	4 10 10
Edison & Swan, A, £8 paid	5	Nil	..	1/8 — 1/4	..	Nil
Do. fully paid	5	Nil	..	1/8 — 2/8	..	Nil
Do. 4 % Deb.	100	4	4	64 — 68	..	5 17 8
Do. 5 % Second Deb.	100	5	5	75 — 78	..	6 8 2
Electric Construction	2	2½	3⅜	1/32 — 1/16	— 1/16	6 19 6
Do. Pref.	2	7	7	1 1/16 — 2 1/16	+ 1/16	6 15 7
Greenwood & Batley, Pref.	10	7	7	7/8 — 8	..	8 5 8
Do. Deb.	100	5	5	92 — 94	..	5 4 2
General Electric, Pref.	10	5	5	10 — 11	..	4 10 11
Do. Deb.	100	4	4	92 — 97	..	4 2 6
Henley's, Ord.	5	15	10†	12 — 12⅜	+ ⅛	5 16 8
Do. Pref.	5	4½	4½	4 15/16 — 5 1/16	..	4 6 9
Do. Deb.	100	4½	4½	102 —104	+1	4 6 7
India-Rubber, G. & T.	10	10	..	8½ — 9½	..	..
Do. Pref.	10	5	5	9½ — 10½	..	4 17 7
Telegraph Construction	12	20	10†	32½ — 34½ xd	..	6 16 6
Do. Deb.	100	4	4	98 —100	..	4 0 0
Willans & Robinson	1	Nil	..	1/8 — 1/4	..	Nil
Do. Pref.	5	Nil	..	1/2 — 1	..	Nil
Do. Deb.	100	4	4	58 — 60	..	6 13 4

* Unless otherwise stated, all shares are fully paid. † Interim dividend.

Bank rate of Discount 3 per cent., May 9th, 1912.

EXPORTS AND IMPORTS OF ELECTRICAL GOODS DURING JUNE, 1912.

THE returns for the month of June again show a substantial increase in exports, as compared with the previous month, and still more in comparison with June last year; imports, however, have declined to the lowest figure touched this year, and re-exports also show a heavy drop, the figures being :—

	Exports.	Imports.	Re-exports.
June, 1911	£366,614	£183,260	£28,688
May, 1912	428,655	206,301	30,806
June, 1912	**461,777**	**171,032**	**19,036**

The average monthly returns for the six months of 1912 now completed, compared with the corresponding half of 1911, are as follows :—

	Exports.	Imports.	Re-exports.
Jan.-June, 1911 ...	£364,938	£205,804	£23,592
„ 1912 ...	**496,825**	**212,497**	**25,862**

These figures confirm the reports of manufacturing companies' which have lately assumed a more healthy complexion.

During the month exports and imports of glow lamps fell off very considerably, no doubt a seasonal effect; machinery exports went up, and imports down. There was an exceptionally heavy export of carbons to the Cape, and an item of £52,000 worth of submarine cable to Italy.

Registered Exports of British and Irish Electrical Goods from the United Kingdom.

Destination of exports and country consigning imports.	Electrical goods and appliances.	Wires and cables, rubber and other insulations.	Electric lighting fittings and accessories.	Electric glow lamps.	Electric arc lamps and lamp parts.	Electric meters and instruments.	Electric machinery.	Electrically-driven machinery.	Batteries and accumulators.	Carbons.	Telephonic cable and apparatus and electric bells	Telegraphic cable and apparatus.	Total.
	£	£	£	£	£	£	£	£	£	£	£	£	£
Russia, Sweden, Norway and Denmark ...	627	672	142	32	12	255	4,064	4,605	...	...	32	905	11,346
Germany	1,295	7,154	32	...	976	3	1,166	...	2	112	12	149	10,901
Netherlands, Java and Dutch Indies ...	304	1,781	263	324	120	214	989	152	...	...	30	658	4,835
Belgium	220	391	41	13	601	1	4,666	1,094	...	...	1,384	4	8,415
France	1,532	40	1,414	...	...	112	5,541	350	...	30	1,180	129	10,328
Portugal	101	73	9	103	...	11	272	...	18	2	101	45	735
Spain, Canary Isles and Spanish N. Africa...	349	65	52	...	33	94	2,537	527	...	...	5	2,504	6,166
Switzerland, Italy and Austria-Hungary ...	224	65	148	...	62	170	2,588	350	...	78	121	52,090	55,896
Greece, Bulgaria, Roumania and Turkey ...	343	144	...	...	...	142	1,094	...	...	...	70	...	1,793
Channel Isles, Gibraltar, Malta and Cyprus...	20	...	13	...	...	19	6,140	...	153	...	...	12	6,357
U.S.A., Philippines and Cuba	244	...	...	46	...	24	104	40	...	29	7	12,359	12,853
Canada and Newfoundland	564	10,104	483	386	...	2,169	8,210	939	116	53	...	998	24,022
British West Indies, British Guiana and British Honduras	54	13	55	32	13	12	115	...	23	...	25	663	1,005
Mexico and Central America	...	...	...	49	...	...	39	...	...	...	160	...	248
Peru and Uruguay	8	...	23	11	...	...	34	...	...	...	...	7,073	7,149
Chile	132	1,060	225	11	...	174	1,295	...	20	...	33	2,235	5,185
Brazil	394	2,183	553	405	75	57	2,301	517	572	...	5,304	20,230	32,591
Argentina	2,596	4,750	574	641	509	131	12,689	477	1,283	176	1,041	2,576	27,443
Colombia and Bolivia...	23	18	1	14	48	...	568	...	...	...	66	...	735
Egypt, Tunis and Morocco	142	271	98	44	28	120	1,231	4	14	22	6	69	2,146
British West Africa and Ascension... ...	175	194	68	...	...	188	575	...	53	...	357	369	1,979
Rhodesia, O.R.C. and Transvaal	1,888	3,358	146	497	37	229	2,011	307	885	...	8,558	951	18,867
Cape of Good Hope	1,178	2,460	389	748	32	343	5,070	...	741	3,697	2,664	2,898	20,220
Natal	691	4,635	73	199	...	63	2,291	...	581	...	58	9	8,600
Zanzibar, Brit. E. Africa, Mauritius and Aden	6	53	47	142	18	...	114	...	24	...	45	13,483	13,932
Azores, Madeira and Portuguese Africa ...	54	279	18	...	...	9	364	210	9	...	131	197	1,273
French African and Indian Colonies ...	...	65	22	...	...	...	...	...	...	...	...	65	152
China and Siam	392	207	118	...	...	731	724	395	238	...	48	12,338	15,191
Japan and Korea	1,765	27,020	392	...	...	1,900	9,867	3,858	363	29	61	1,390	46,645
India	2,233	5,248	2,229	2,734	330	1,168	7,218	3,673	826	145	1,023	1,618	28,645
Ceylon	225	38	195	147	...	60	1,190	76	21	...	24	137	2,113
Straits Settlements and Fed. Malay States	303	165	556	47	20	53	476	828	...	39	17	256	2,760
Hong Kong	199	169	173	71	...	562	508	4	24	...	49	33	1,792
West Australia	375	1,388	...	466	254	242	560	3,838	128	...	1,474	168	8,890
South Australia	379	760	26	...	37	...	434	109	8	...	1,621	21	3,395
Victoria	705	4,479	507	1,730	144	107	1,967	216	59	6	114	4	10,038
New South Wales	2,061	3,235	1,033	1,680	28	1,907	17,189	532	254	...	3,037	945	31,901
Queensland and Tasmania	333	1,291	118	194	...	30	2,378	...	37	...	80	...	4,461
New Zealand	1,130	423	365	52	...	...	6,342	...	527	8	...	1,926	10,774
Total, £	23,264	84,251	10,598	10,818	3,377	11,300	114,921	23,298	7,079	4,426	28,938	139,507	461,777

Registered Imports into the United Kingdom of Electrical Goods from all Countries.

Norway, Sweden and Denmark	64	...	...	71	5	8	2,350	75	231	213	7,283	10,300
Germany	3,299	3,694	16	11,189	3,643	1,431	60,152	89	3,289	2,501	12,705	102,008
Holland	47	158	...	558	115	...	3	...	...	15	71	967
Belgium	265	493	30	5	32	38	1,095	14	64	170	8,300	10,506
France	221	420	1,539	...	513	264	379	...	1,622	3,522	4,695	13,175
Switzerland	97	838	...	...	...	8	1,827	...	...	4	1,408	4,182
Spain and Italy	48	2,508	...	...	...	...	372	...	...	243	2,372	5,543
Austria-Hungary	...	895	...	342	...	...	256	...	29	189	391	2,102
United States	2,305	4,126	...	445	2,022	57	6,098	6,671	58	17	140	21,939
Total, £	6,346	13,132	1,585	12,610	6,330	1,806	72,532	6,849	5,293	6,874	37,365	170,722

Additional imports: Spain, carbons £310.

Registered Re-Exports of Foreign and Colonial Electrical Goods from the United Kingdom.

Various countries, mainly as above ...	16,265	747	...	533	442	...	790	...	8	176	75	19,036

TOTAL EXPORTS: £461,777. TOTAL RE-EXPORTS: £19,036. TOTAL IMPORTS: £171,032.

NOTE.—The amounts appearing under the several headings are classified according to the Customs returns. The first and third columns contain many amounts relating to "goods" otherwise unclassified, the latter, doubtless, consisting of similar materials to those appearing in adjacent columns. Imports are credited to the country whence consigned, which is not necessarily the country of origin.

MAINS DEPARTMENT RECORDS.

BY "RECORDER."

IT is so difficult to make profits, and our friends, the L.G.B. inspectors, are so down on much expenditure that would really make for efficiency in the station, that there is a tendency to scamp records. At times one is apt to envy the days when the chief was a personage in the clouds, who might be approached—even by consumers—only when it suited his will. It is related of one man in those far-off times that, as he reclined peacefully smoking one summer's day among the trees, on the far bank of the river which flowed past the works, a clerk came out of the office and shouted that a prospective consumer wanted to see him. "Tell him I'm busy," was the reply, and soon the chief was lying on cushions in the stern of a boat pulled by an obliging friend. Nowadays the likely consumer is angled for as eagerly as if he were a big trout in summer time when the water runs clear.

Perhaps those days were not so good after all. Certainly the big (?) set used to break down at intervals on peak load, sometimes leaving the town for days without juice, and everybody spoke with admiration of the new dynamo, whose sparking was so subdued that it would actually carry three-quarter load without blowing its brushes to pieces, and without diffusing the smell of burnt insulation throughout the engine-room. Certainly, the important task of keeping records of the mains as they were laid was too often neglected. For a time the wonderful memory of Bill the jointer sufficed, but when Bill disappeared, and the mains superintendent got another job, it became a serious matter to find out just where the mains were and where they were not. Do we not all remember the case of one station which kept current pouring into an unknown leaky cable until the arc nearly cut through a railway bridge girder? No doubt a draughtsman should be kept continually entering up elaborate drawings of all mains on large-scale maps, but too often this is prevented by lack of cash. Since the pleasing fiction has been created by L.G.B. Inspectors (for reasons best known to themselves) that cables fade away in a few years after being laid, so that they must be paid off by abnormal sinking funds, and meters are supposed to have lives of only two or three years, and therefore must be paid for out of revenue, while the yearly income must also pay for all permanent labour required for capital extensions (unless inefficient casual labour be employed, in which case it may be charged to capital), there is little or nothing left wherewith to provide a draughtsman. At any rate this is so in small struggling stations, in which the recording work must be done at odd times by a poorly paid assistant who may not be enamoured of his job.

Even when a capable man has been retained it is difficult to enter up the cables in an efficient manner without undue expenditure. A common plan is to try to indicate different kinds of mains on the maps by the use of differently coloured inks, or by lines broken in various ways, but this method has its defects. Take, for instance, a footpath in which are laid two or three lighting feeders, a pair of tramway feeders, a lighting distributor with services, and an arc lighting cable, laid over a long period of years, and on varying systems, solid, drawn-in, armoured, bitumen-covered, &c., with a multitude of sectional areas, some cables being single conductors, and some of other types. To represent such a conglomeration adequately by any of the above methods is impossible. Books or cards of some kind must be kept in addition to the maps, in which must be entered all the essential details for which there is not room on the map.

In the following system of records, which has been in use for many years in a station, will be found a compromise between undue elaboration and scantiness, although the amount of detail required will obviously vary with circumstances. Each length of cable is drawn on the map as soon as possible after it is laid, one set of maps being used for feeders, and another for distributors; if desired, a third set may with advantage be set apart for street-lighting records. (A rough plan of small scale may be hung on the office wall, giving the position of distributors without detail. This is useful for general purposes.) On the map may be entered some notes, but these must be brief, as the space available is scanty. Full details are written up in the Mains Book, in which is written a description of the cable, maker's name, drum numbers, date of laying, depths and distances from the walls or kerbs, and tests. Accurate measurements of joints from fixed points must also be written up, so that any one may be found with the least possible delay, and along

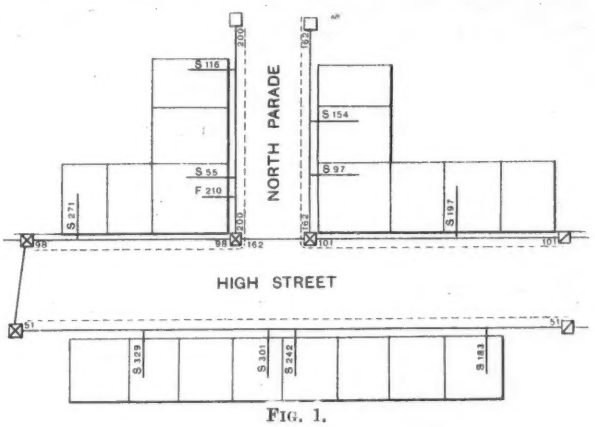


FIG. 1.

with this should be given an account of the joint-box used, filling-in compound and jointer's name. This forms a check on the jointers, as blame may be located should a fault occur through careless laying, even if the trouble happen years afterwards. This fact makes the men careful, and is, indeed, a valuable safeguard. At the ends of each length of cable laid is entered the number of the page in the mains book in which the account is written, so that the map acts as an index. Even if the mains be laid in small sections at long intervals, one is able instantly to turn up the entries relating to them, which is a great convenience in emergency. In the mains book may be drawn enlarged details of special circumstances, such as deviations to avoid cellars and pipes belonging to other people, or, where necessary, drawings may be made on loose sheets, which may be filed and indexed in the mains book. A fault may be marked with the letter "F," and the number of the page in which an account of it is written up. The diagram above, fig. 1, will show how the scheme is carried out.

Services are indicated by the letter "S" with the page number on which details are entered. They may be drawn in red, and should be entered up in a separate book, called the Service Book, in which details similar to those mentioned in the case of distributors are written up. Services should also be written up on cards, which enables balancing to be followed easily.

Drum books are kept, in which is written an account of every drum of cable which enters the stores. Maker's name, drum number, date of arrival, length, sectional areas, style of cable and insulation, tests, &c., all are entered. Each length cut off is noted, and all lengths are added up when the drum is empty, so that the whole of the cable is accounted for and any leakage is traced. The date on which the drum is returned to the makers forms the final entry. Drum books are particularly useful for stocktaking, and also enable one to judge when further supplies of cable are required.

Meters.—The recording and indexing of meters have been debated frequently, and men in control of large test rooms have expressed varying opinions. Some prefer card systems throughout, but it is noticeable that many people still prefer that books should be made use of to some extent, and, for my part, I agree with them. Ease of changing them about is the chief reason for the use of cards, which have otherwise many disadvantages, but for the primary index there are advantages in the certainty of reference possessed by the bound book. A card may easily be lost in a small meter department, where everything, including testing and clerical work, is done by one or two men, and once lost it is by no means certain that track of that meter will be recovered. The following system for recording meters may seem rather elaborate, but it has proved satisfactory in actual working. The primary index is composed of a set of books, which should be made up of good paper, thoroughly well bound. The strength of binding is important, as badly made books

fall to pieces before they are obsolete. Three hundred pages makes a handy size, the page being of sufficient dimensions to enable the details to be entered without cramping. The ruling may be in accordance with the diagram, fig. 2, modifications being made to suit requirements. The pages of the meter book are numbered, and each meter, when it arrives, is given the number of the first vacant page. Clock meters, indicators, and, in fact, every kind of meter, may be entered in the same book in rotation. The maker's name, capacity and type of meter, and other permanent items, are

Maker's Name.	Maker's No.	Received.	Type.	Amps.	Volts.	Testing "K."	
Hookham.	93,274	5/2/10	Amp.-hour.	10	200	3·7	Meter No. 1,000.

Consumer's Name and Address.	Service No.	Test. Full	½	¼	Tested by.	Test Book.	Sent Out.	Returned.
Jones & Co., 50, High Street.	1,983	+ ·5	0	− ·2	G. D. M.	829	10/3/10	13/3/12 Damaged.

FIG. 2.

entered at the top of the page, while details relating to services on which it is put are entered below. The full history of a meter may thus be promptly traced. If more details are required of meter tests than are shown in the test column, these may be entered in a separate test book, and indexed in the test book column.

Consumers' Cards.—Cards are made out for each consumer, giving details of the meters on his premises. From the meter book, therefore, we may find out where any particular meter is, or from the consumers' cards we may learn what meters are on any service.

Meter Ledger.—A ledger is required to keep a check on the stock. This should be a substantial book with not too many leaves, as it may become ragged if its life be unduly prolonged. On one side is entered the stock at the beginning of the year, with columns for the principal sizes used. Separate columns may be added for indicators, clock meters, &c. Each meter coming in, whether from makers or from consumers' premises, is entered up in the ledger on the inwards side, the maker's name, meter number and type being stated to enable it to be recognised, while the figure "1" is entered in the proper column. Similar entries are made on the outwards side when the meter is sent out. At the end of the year, stock-in-hand is entered on the outwards side, and balances are taken. Any shortage can instantly be traced to its proper columns, for, as the meter numbers on the outwards side are identical with those on the inwards, a comparison of numbers on the two sides will disclose the identity of the missing meters, which may then be looked up in the meter book, when their fate will probably be discovered.

NOTES FROM CANADA.

[FROM OUR SPECIAL CORRESPONDENT.]

ON June 29th Canada lost one of her most prominent and brilliant engineers, Cecil Brunswick Smith. Much has been accomplished in his short life of 47 years. The chief interest in his career to electrical engineers lies in his work in connection with the large power station of the Canadian Niagara Power Co., which contains generating plant aggregating more than 50,000 H.P. with powers to take up to 110,000 H.P. From June, 1906, to February, 1907, Mr. Smith was a member of the Hydro-Electric Power Commission, of Ontario, and afterwards was the chief partner in the well-known firm of consulting engineers, Messrs. Smith, Kerry & Chace, of Toronto, &c., who have won a wide reputation in the design and equipment of large hydro-electric power schemes at Winnipeg, Calgary, in Eastern Ontario and other parts of Canada, not to mention similar schemes in the U.S.A.

One of the buildings in the Western city of Regina, Saskatchewan, which on June 30th was visited by a terrific hurricane, leaving death and destruction in its path, was the Provincial Government telephone exchange—the whole place being, it is reported, completely wrecked.

£60,000 is the expenditure voted by the city of Brandon, Manitoba, for the construction of 10 miles of street car lines.

French and Canadian capital is invested in a new concern called the Stadacona Hydraulic Co., which proposes to develop 10,000 H.P., as a commencement, at Seven Falls, a short distance from St. Anne de Beaupré, which is a town on the St. Anne River, a tributary of the St. Lawrence, which joins the latter river on its northern shore, at a point about 25 miles north-east of Quebec.

From a well-known electrical engineer here comes a warning, which may well be heeded by British firms represented here, with reference to the choice of a representative. Engineers here are sometimes chary of placing an order with even a first-class home firm if they feel that, in the event of anything going wrong, the local representative is not the man to see the job through satisfactorily. On the other hand, firms of repute with capable men at this end appear to be giving satisfaction.

The choice of a good man is a matter of moment and not always easy of attainment, for a Britisher new to this country cannot do his best till he is accustomed to Canadians and their ways, and a Canadian, although perfectly *au fait* with everything which concerns this end, is probably sadly lacking in a knowledge of home practice. The best man, undoubtedly, other things being equal, would be he who has had two or three years' experience here, but who has received his training at home.

Long-distance overhead transmission is all very well in its way, but in Toronto early this month (July), if the statements of the company concerned be correct, it has had its drawbacks. Owing to numerous thunderstorms no fewer than four serious interruptions have occurred in the service from Niagara to Toronto, each of which has, for a more or less extended period, amounting in one case to about four hours, stopped all the tramcars and paralysed innumerable works and factories, large and small.

A special Providence seems to have watched over the Hydro-Electric Power Commission's supply, as there has been no interruption at all—result, much kudos for the Commission and great confusion of face for the company. How much of this situation is due, on the one hand, to pure good luck or to excellent foresight and design, and, on the other hand, to ill-luck or utter mismanagement, it would be hard to say. In the meantime, the public draws its own conclusion, while the company holds out bright, if somewhat remote, hopes for the future—viz., next summer.

The Board of Railway Commissioners has just approved the plans of the Canadian Northern Railway Co. for a tunnel which it is proposed to cut under the Mount Royal in Montreal. The railway company is thus creating a new outlet for Montrealers, and to increase the usefulness of the tunnel it is building a garden suburb on the other side of the mountain. Now that the plans have been approved, it is to be expected that the work will be pushed ahead as rapidly as possible; the interesting point to electrical men respecting the tunnel is that it is, the writer believes, intended to employ electric locomotives through it. The tunnel will probably be completed in about two years' time.

The Shawinigan Falls Power Co., which supplies Montreal with current, has just ordered a 15,000-KW. 60-cycle generator, this being the largest in Canada.

News from Montreal states that an electric railway scheme is being promoted, to connect Ottawa and Kingston; the two towns are about 90 miles apart, the latter being almost due south of the former on the shore of Lake Ontario.

Kingston has also been brought into prominence recently by its decision, on the advice of an expert, to refuse offers for the supply of electric current from both the Hydro Electric Power Commission, of Ontario, and the Seymour Power Co. The town has decided to extend its own steam plant, the expert having reported that in this way the town could, for several years to come, generate its own electricity at lower cost than that at which it could obtain a supply from either of the competing parties referred to.

The engineers of the Quebec Commission on Running Waters and of the Ontario Hydro-Electric Power Commission are to be instructed to prepare reports on the subject of the development of Chats Falls, on the Ottawa River. According to the Commission of Conservation, these falls are capable of furnishing 58,000 H.P. under present conditions, or 150,000 H.P. "with regulated water and canalised river"; the falls are situated about 30 miles east of Ottawa.

TRADE STATISTICS OF NEWFOUNDLAND.

THE following statement of the imports of electrical and similar materials into Newfoundland is taken from the recently issued annual trade statistics for the year ended June 30th, 1911; figures for 1909-10 are added for purposes of comparison, and notes of any increases or decreases are given:—

Dollar = 4s. 2d.

	1909-10. Dollars.	1910-11. Dollars.	Increase or decrease. Dollars.
Belting.—			
From United Kingdom ...	1,000	3,000	+ 2,000
„ Canada	6,000	5,000	− 1,000
„ United States ...	12,000	18,000	+ 6,000
Total ...	19,000	26,000	+ 7,000
Gutta-percha manufactures.—			
From United Kingdom ...	7,000	9,000	+ 2,000
„ Canada	31,000	35,000	+ 4,000
„ United States ...	35,000	50,000	+ 15,000
„ Other countries ...	—	1,000	+ 1,000
Total ...	73,000	95,000	+ 22,000
Iron and steel railway bars and fittings.—			
From United Kingdom ...	1,000	—	− 1,000
„ Canada	2,000	2,000	—
„ United States ...	30,000	7,000	− 23,000
Total ...	33,000	9,000	− 24,000
Locomotives and automobiles.—			
From United Kingdom ...	17,000	32,000	+ 15,000
„ Canada	44,000	5,000	− 39,000
„ United States ...	35,000	21,000	− 14,000
Total ...	96,000	58,000	− 38,000
Radiators, electric light material, &c.—			
From United Kingdom ...	3,000	10,000	+ 7,000
„ Canada	14,000	9,000	− 5,000
„ United States ...	24,000	46,000	+ 22,000
„ Germany	1,000	1,000	—
Total ...	42,000	66,000	+ 24,000
Machinery for mining purposes.—			
From United Kingdom ...	46,000	51,000	+ 5,000
„ Canada	93,000	142,000	+ 49,000
„ United States ...	38,000	39,000	+ 1,000
Total ...	177,000	232,000	+ 55,000
Machinery for local industries.—			
From United Kingdom ...	7,000	10,000	+ 3,000
„ Canada	11,000	1,000	− 10,000
„ United States ...	9,000	7,000	− 2,000
Total ...	27,000	18,000	− 9,000
Motor engines.—			
From United Kingdom ...	1,000	1,000	—
„ Canada	1,000	3,000	+ 2,000
„ United States ...	6,000	17,000	+ 11,000
„ Denmark	7,000	4,000	− 3,000
Total ...	15,000	25,000	+ 10,000
Scientific instruments.—			
From United Kingdom ...	1,000	1,000	—
„ Canada	1,000	—	− 1,000
Total ...	2,000	1,000	− 1,000
Goods for Anglo-American Telegraph Co.—			
From United Kingdom ...	2,000	—	− 2,000
„ Canada	1,000	—	− 1,000
„ United States ...	3,000	—	− 3,000
Total ...	6,000	—	− 6,000
Materials for wireless telegraphy.—			
From United Kingdom ...	—	6,000	+ 6,000
„ United States ...	—	1,000	+ 1,000
Total ...	—	7,000	+ 7,000
Materials for Western Telegraph Co.—			
From United Kingdom ...	—	15,000	+ 15,000
„ United States ...	—	1,000	+ 1,000
Total ...	—	16,000	+ 16,000
Material for Direct Cable Co.—			
From United Kingdom ...	—	18,000	+ 18,000
„ Other countries ...	—	1,000	+ 1,000
Total ...	—	19,000	+ 19,000

PROCEEDINGS OF INSTITUTIONS.

The Faraday Society.

PROPERTIES OF ALUMINIUM ANODE FILMS.

At the July meeting of the Faraday Society, MR. G. E. BAUSTO, M.SC., B.ENG., presented a further study of these interesting and remarkable electrolytic formations, following on his paper of last year on the same subject. The present communication deals with the effect of temperature on the conductivity of the films. This can be expressed by the exponential relationship $i = A E^{a\theta}$ or $\log i = \log A + a\theta$, where i is the leakage current through the film, and θ the temperature. The universal obedience to this logarithmic law suggests that the relationship has some physical significance, although it is not quite clear how it follows from Mr. Bausto's theory of aluminium films, according to which the films consist of an inner portion, probably oxygen in a liquid or highly condensed form, and an outer portion, whose constitution varies with the electrolyte.

The exponential constant "a" is of considerable interest, as it was found to be independent of the time of formation of the films, the voltage of formation, the strength of the electrolyte, the cation present in the electrolyte, and, up to a point, the applied voltage on the cell. It varied, however, with the electrolyte, and it was proved to be a property solely of the anion, being a definite function of the quantity given by the sum of the atomic weights of the elements in the anion divided by the valency; in other words, of the equivalent weight of the anion. This relationship is shown in the accompanying curve, fig. 1, and when once this curve has been obtained it furnishes us with a method for the determination of the equivalent weight of the anion in an electrolyte.

A NEW ELECTROCAPILLARY EFFECT.

A paper by MR. A. P. ROSHDESTWENSKY and DR. W. C. MCC. LEWIS described some curious pulsations of a mercury meniscus confined in a capillary tube dipping into a solution of a mercury salt, which were first observed accidentally during the progress of some experiments with a capillary electrometer. The movements of large mercury surfaces in contact with various substances have been observed many times, but such effects have usually been traced to the formation in the mercury of films of insoluble salts, whose presence alters the surface tension of the mercury, and which break mechanically, setting up vibrations, as they grow thick. These effects take place without the application of any electromotive force, but the present observations are truly electro-capillary. The apparatus employed is shown in the accompanying diagram, fig. 2.

The E.M.F. up to 1·5 volts was applied between the capillary B and D, the former being the negative and the latter the positive pole. The solution to be examined was placed in the tube B. The difference between the levels of mercury in A and A^1, read by a tele-

scope, gave the increase or decrease in pressure required to bring the meniscus in B to the zero point.

As an example of the kind of pulsation which took place, the case of a decinormal solution of Hg $(CN)_2$ may be considered. This solution supported a mercury column 550 mm. in height. No pulsation was observed until the applied E.M.F. reached 1 volt. Then on closing the circuit, the mercury meniscus was seen to rise slowly for about 6 minutes, and it then commenced to pulsate over amplitudes of about $\frac{1}{10}$ mm., the time of oscillation being 12 seconds.

The occurrence of pulsation is determined by three factors :—(1) The value of the applied E.M.F. ; (2) the diameter of the capillary ; (3) the nature of the solution. With regard to (1), as the E.M.F. increased, the amplitude of the pulsation increased, but there did not appear to be any corresponding change in the periodic time. As to the capillary, when it was so fine that it would support a column of mercury 700 mm. in height (*i.e.*, a diameter less than

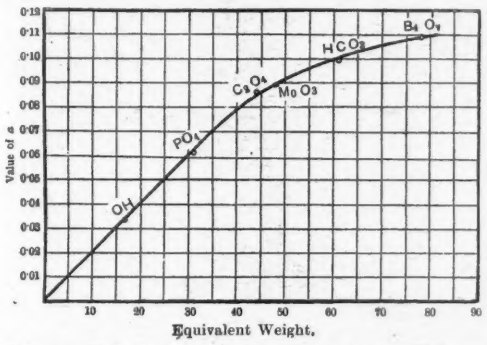


FIG. 1.—VARIATION OF *a* WITH EQUIVALENT WEIGHT OF ANION.

0·02 mm.), no pulsation occurred under any E.M.F. applied. With larger capillaries, the lower limit was found to vary with the strength of the solutions. The question of an upper limit has not been investigated. With regard to the solution, pulsations have been observed with saturated and decinormal solutions of Hg $(CN)_2$, but none have appeared with the more dilute solutions N/100 and N/1,000 Hg $(CN)_2$, and none have been observed when the mercury cyanide solutions have contained free potassium cyanide. These limitations suggest that for the pulsations to take place, the mercury ion concentration must not be too low.

The pulsations only appear with an E.M.F. sufficiently high to annul the natural P.D. between the mercury and the solution ; in other words, the natural charge on the mercury surface has to be removed before visible pulsation sets in. Further, a small amount of electrolysis must be continuously going on, $Hg^{\cdot\cdot}$ or $Hg_2^{\cdot\cdot}$, or some complex cation being carried towards the capillary mercury surface. The approach of these cations will induce a charge of opposite sign, that is, cause the mercury to become more negatively charged with respect to the solution than it already is, and this would decrease the surface tension. This may explain the second

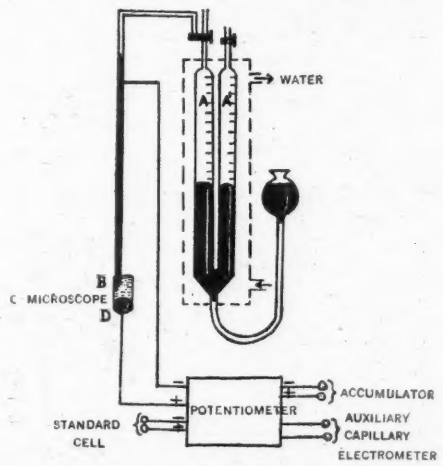


FIG. 2.

stage of the pulsation, the fall of the mercury column. The initial stage, the slow upward movement of the mercury column, or a slow increase in the surface tension, is more difficult to account for. It may be caused by a reduction of the mercuric solution to the mercurous state, although this does not seem likely. Experiments with mercurous solutions would have to be made before this point could be settled. The pulsations, as a whole, are quite analogous to the case of a leaky condenser which is being gradually charged up until the insulation finally breaks down. The accumulation of cations, whether due to capillary or to electrolytic movement of the ions, would go on, depending on the rate at which the ions approach the surface and forming a double layer ; the ions induce a greater and greater negative charge on the mercury, thereby lowering the tension until the potential across the double layer becomes too great for the medium and deposition of metal occurs. This would momentarily cause a sudden fall in the P.D., whereby the mercury would rapidly return to its original position, with consequent stirring of the solution in the neighbourhood. The conditions would thus be once more those of the first stage.

NEW ELECTRICAL DEVICES, FITTINGS AND PLANT.

"Meta" Flat Switches.

The manufacture of flat switches has long been a speciality of the METALLIC SEAMLESS TUBE CO., LTD., of Wiggin Street, Birmingham, and they have now sent us particulars of their most recent patterns. The complete range is illustrated in leaflets A7/14 to A7/22, which cover switches for 5 and 10 amperes, single or double-pole, and fitted with either brass or china covers. The switches are divided into two classes—the "Standard" and the

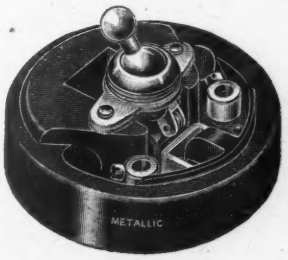


FIG. 1.—"META" STANDARD SWITCH INTERIOR.

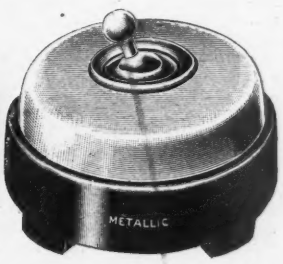


FIG. 2.—"META" FLAT SWITCH ON EXPORT BASE

"Colonial" patterns—which differ only in that the former has a brass link movement, while the latter is fitted with a steatite link, and is particularly suitable for use in damp positions. The interior of the standard pattern is shown in fig. 1 ; two of these mounted together on a wooden block, with coupled dollies, form the D.P. switch. The standard and colonial patterns are also to be had on the "export" base, fig. 2, which has small feet, keeping the switch about $\frac{1}{16}$ in. from the wall. A two-way switch is made, as well as a pattern with an earthing terminal ; and lastly, in fig. 3, we show

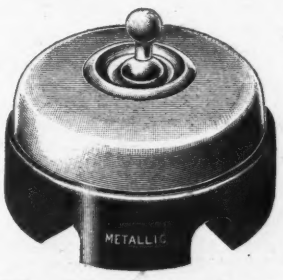


FIG. 3.—"META" SWITCH WITH GROOVED BASE.

a switch mounted on a grooved base for surface wiring—a pattern of which large quantities have been exported to Continental countries. The dolly can be provided with an insulated knob, and the bases, which are of English porcelain, are white or black as required.

A Thermo-Regulator for Electric Resistance Furnaces.

The electric resistance furnaces used in the laboratory are not ordinarily fitted with special means for regulating the temperature, and therefore give more or less fluctuating temperatures, according to the constancy of the supply current and the temperature of the room. This is not a serious matter in the majority of investigations ; but when the process under study is very sensitive to temperature, it is desirable to exclude the variations if possible. The principle used by MAX BODENSTEIN and FRANZ KRANENDIECK in their thermo-regulator, described in the *Zeit. für Elektrochemie*, is that an enclosed volume of nitrogen forces a thread of mercury into a glass capillary when temperature variations occur, and this mercury opens and closes a relay and alters the current heating the furnace. This principle is very simple and well known, but the difficulty has been to put it into practice. When the regulator was placed in the usual type of furnace, very large temperature fluctuations were observed, which were undoubtedly due to temperature lag. This can be got over by winding the heating

spiral inside the regulator vessel; and, as a matter of fact, Dr. Horak, along with one of the writers, was enabled to secure a satisfactory constancy of temperature in this manner. However, only one specimen of the device was made, since too much work would be involved in making others, in view of the life of the nickel-wire furnaces being very limited. The writers have proceeded in the following manner:—

The temperature variations of a furnace arise from variations in the supply voltage, variations in the room temperature, and the

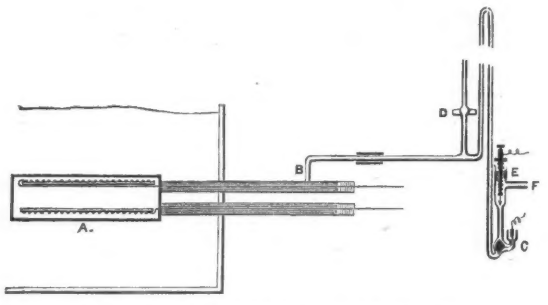


FIG. 4.—SECTION OF THERMO-REGULATOR.

heating effect of the reactions taking place. The last-named factor may be ignored. The first two changes, however, will influence in the same manner two furnaces worked in parallel, assuming that the exchange of heat with the surroundings is similar in both. Thus, if a second furnace is set up alongside the working furnace, and if instead of having the usual wound tube the second furnace contains a porcelain or metal bulb, in which the heating coil lies, the change of pressure of the gas contained by this bulb can be used to keep the temperature constant, after the fashion of an ordinary thermo-regulator. The practical realisation of this idea is shown in the illustration, fig. 4, where A is the regulator vessel, a weldless steel tube, 45 mm. in diameter, and 180 mm. long. Into the cover of this steel tube are inserted insulated current leads. Inside the vessel two short pins project through the cover, and, in conjunction with three similar ones let into the bottom of the vessel, they support a thin-walled porcelain tube, on which the nickelin resistance is wound.

Like the working furnace, this vessel lies in an asbestos box filled with burned magnesia. At B a steel capillary leads from the vessel to the mercury contact C. The stopcock D serves for introducing the nitrogen and for coarsely adjusting the volume to be used. Fine regulation is secured by the contact screw E. In order to prevent the mercury from working back into the regulator vessel when the heating current is intentionally cut off, a loop, ½ mm. in diameter and nearly 760 mm. long, is inserted between the steel capillary and the contact, and underneath the loop is an extension. This regulator must not, of course, work against the outside atmospheric pressure, otherwise barometric variations will cause errors. A closed air-volume is therefore introduced at F in a Dewar vessel, kept constantly in ice. It is protected against the outside air at the contact screw by a mercury seal, and can be filled or relieved by a cock attached laterally.

The writers state that this regulator does more than those which keep the voltage at the furnace constant, since it compensates for the variations in room temperature. It has been possible with the regulator to keep temperatures of 800° to 900° C. constant to within 1° over periods of several weeks.

Electrically-Driven Frequency Recorder.

To meet the necessity for a permanent record of the frequency of supply in A.C. stations, a device was brought out by MESSRS. JENS ORTEN-BÖVING & CO., of 9½, Union Court, Old Broad Street, E.C., and supplied to the Newcastle-on-Tyne Electric Supply Co., in which a combined tachometer and tachograph, operating upon the centrifugal pendulum principle, was driven by a horizontal synchronous motor mounted on the same base plate, and connected to the tachograph spindle through bronze bevel gearing. Slight troubles were, however, experienced from vibration due to the horizontal arrangement, and although after several alterations and repairs this instrument is now running very satisfactorily, the makers felt that something more suitable might be devised by the employment of a vertical motor. They have therefore, after many careful tests, put on the market an instrument in which practically the same tachometer and tachograph have been employed, but a special base has been added to it to take a neatly enclosed self-starting synchronous motor, which is mounted vertically very close to the tachograph spindle, to which it is directly connected by a flexible coupling. Ball bearings take up the weight of rotor and tachometer pendulum, with the result that the whole apparatus runs without vibration, and takes very little power to drive it. The tachometer pendulum, which acts on the principle of the centrifugal governor, has been designed so that the centrifugal force of the weights is directly opposed by the springs without the intervention of cranks or levers, and the outward motion of the weights is a rotating one, so that all friction is taken up by a small steel spindle. The ratio of the internal friction to the centrifugal and centripetal forces (which constitutes the insensitiveness) is extremely small, and any change in speed, however small, is therefore instantly and exactly recorded. In addition, four weights are employed, which, being in exactly opposed positions, keep the whole pendulum balanced, and the instrument is therefore unaffected by vibration or position. Efficient dampers are fitted to secure a smooth and easily read curve without destroying its accuracy.

The recording mechanism consists of a paper chart 19 in. long by 4½ in. wide, which is fixed to an aluminium drum driven by an eight-day clock, and so arranged that, by means of a little switch, it can be made to revolve once every 12 or 24 hours as desired. A small steel fountain pen, capable of very nice adjustment, is screwed

FIG. 5.—ORTEN-BOVING FREQUENCY RECORDER.

to a little roller carriage, which moves up and down between two guide rods, and is connected directly to the indicator mechanism by a straight rod.

The dial is about 13 in. in diameter, and both dial and chart are calibrated in cycles per second and corresponding revolutions per minute to suit the generating station for which the instrument is made. The whole instrument, as shown in fig. 5, stands nearly six feet high, and is finished in black, with silver plated edges, rims and lubricators.

Especial care is taken in the testing of each instrument, which is completely calibrated by hand, so that absolute exactitude is assured at all speeds, and the makers guarantee each instrument for twelve months.

The Glasgow Corporation and the British Thomson-Houston Co. are amongst the users of these instruments, and express perfect satisfaction.

An Electric Riveter.

An account is given in the *Génie Civil* of an electric riveter made by MESSRS. KARL FLOHR, which is illustrated herewith in part section, fig. 6. The armature *a* of the motor, which is pivoted at *b*, can be coupled to the shaft *c*, which is screwed to fit the swivelled nut *i*; the armature runs continuously in one direction, and the coupling is effected by a magnetic clutch in the fly-wheel, which is controlled either by the lever *e* or automatically by the

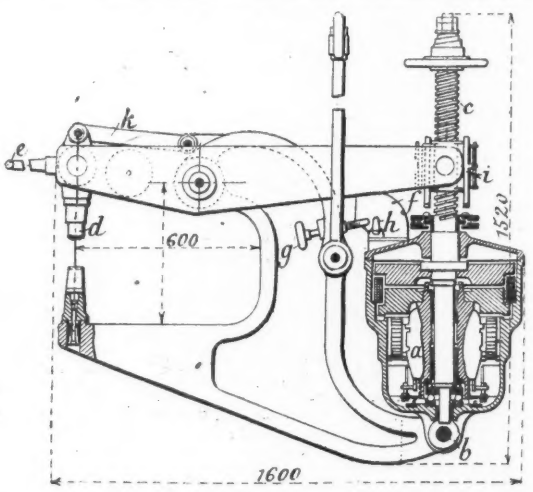


FIG. 6.—KARL FLOHR ELECTRIC RIVETER.

contacts *g h*, which actuate the circuit-breaker *f*, and are adjusted so that the armature is unclutched before the die touches the rivet. The closing of the rivet is therefore effected by the momentum of the fly-wheel on the screw-shaft *c*; at the same time a spring on the end of the shaft *c* is compressed, and serves to bring the nut *i* back to place after the operation. The die-head is pivoted to the lever which carries the nut and to a rod *k*, which

maintains the die always in alignment with its fellow. The machine weighs about 1,200 kg., and is suspended at its centre of gravity from a crane by a swivel, so that it can easily be manipulated by one man with the handle *e*.

DAVIS ELECTRICAL CO., LTD.

[ENHANCED DEBENTURE SECURITY.]

AN inquiry was held on Tuesday, before Mr. Registrar Hood, at the London Bankruptcy Court, into the affairs of Davis Electrical Co., Ltd., 17, Moor Street, Cambridge Circus, W.C., against which a compulsory winding-up order was made last January upon the petition of a creditor. The accounts filed under the liquidation showed assets valued at £2,923 and entirely absorbed in the debenture claims of £3,313; unsecured debts, £3,358; and with regard to contributories a deficiency of £4,786.

Mr. H. Brougham, Senior Official Receiver, attended for the Board of Trade to conduct the inquiry; Mr. Rook represented the Sloan Electrical Co.; and Mr. Whateley was briefed on behalf of Mr. Harry Emanuel Davis, the only witness called to give evidence.

Replying to Mr. Brougham, the witness stated that he was the managing director of the company which was formed in October, 1908, as a private company, to acquire and carry on his business of manufacturer of and dealer in electric and other lamps and electrical accessories at 17, Moor Street. Witness had started the business in 1903. The accounts of the trading for the three years preceding the formation of the company showed a gradually diminishing profit. In 1905 it was £559; in 1906 it was only £484; and in 1907 it had fallen to £377.

What was your object in forming the company?—It was to obtain further capital, and his father-in-law (Mr. Charles Levy) was willing to provide it on the security of the debentures. The additional capital was required in order to increase the turnover, and, consequently, the net profits.

Was it not only required for the payment of current liabilities?—The witness agreed that a portion of the money so obtained was used in that manner, although he could not state the amount. The directors were Mr. Chas. Levy, Mr. Harry Norman Howlett and himself. Mr. Howlett had been a trade competitor for 12 years. The directors' qualifications of £10 shares each were all provided by witness, who was appointed managing director for life at a salary of £500 per annum.

How was that salary arrived at, having regard to the profits previous made?—The average of the three previous years was £400 a year, and it was thought that with an increased capital there would be increased turnovers and profits. Mr. Howlett was to receive £3 10s. per week and a commission of 20 per cent. on the net profits, his duties being to supervise the shipping department, and to act as buyer and general representative of the company. He remained on the board of directors until the company was wound up, when he went abroad. Mr. Levy retired from the directorship in March, 1910. The purchase agreement was executed on October 12th, 1908, and by its terms the company agreed to purchase the goodwill and assets of the business as at January 1st, 1908, subject to the liabilities at that date. The company were to make up any deficit or retain any surplus; they were to purchase the fixtures and fittings, stock in trade, and the equity in the lease of 17, Moor Street; that lease was valued at £370, and was held by the bank as security for an advance of between £400 and £500. The purchase consideration came out at £1,998, and was satisfied by the issue of 998 fully-paid ordinary shares of £1 each, and £1,000 debenture bonds, carrying 5 per cent. interest, and covering the whole of the company's assets. As the business was to be acquired from January 1st, 1908, witness was to receive £200 for his services between that date and the date of completion.

Asked why the business was taken over as from January 1st, 1908, the witness explained that the reason was to avoid the expense of stock-taking and accountants' fees. The goodwill was taken at £1,129, and the purchase price was fixed after consultation with his solicitor and accountant. At the first board meeting held on October 12th, 1908, witness was allotted 998 shares, and the directors authorised the issue of debentures for a sum not exceeding £2,000 at 5 per cent. interest, and to be secured on the company's assets. The purchase was completed on November 12th, 1908, when 10 debentures of £100 each were issued to him. On the same day five debentures for a like amount were issued to Mr. Levy for cash advanced. The trading accounts for the year 1908 showed a trading profit of £155, but after charging witness's remuneration of £268, and the debenture interest of £10, that profit was converted into a loss of £123.

Therefore, the company was insolvent from the start?—I understood from the accountant that there were more assets.

The assets, apart from the goodwill, amounted only to £800 or £900?—Yes.

Mr. Whateley advised the witness not to answer a question in the affirmative if he did not thoroughly understand it.

Was the balance of assets over liabilities sufficient to cover the debentures that were issued?—I cannot say; I do not quite understand it.

Further examined, the Witness agreed that the result of the company's trading had been a continuous loss. In 1908 it was £50; in 1909 it was £834; in 1910 it was £63; and for the nine months in 1911 until the appointment of a Receiver for the debenture-holders, it was £1,718. In consequence of those losses, it was deemed necessary to obtain further funds with which to carry on the business, and they were provided, from time to time, by Mr. Levy, on the security of debentures. The first issue was exhausted by the allotment on November 12th, 1908, of £1,000 to witness as part of the purchase consideration; of £500 on the same date to Mr. Levy for cash advanced; and in September, 1909, of £500 to Mr. Levy, also for cash advanced. Then on May 16th, 1910, an issue of £2,000 second debentures was authorised, of which Mr. Levy received £600 for cash, one-half being advanced at the time, and the other half having been advanced one month previously, and witness received £500, being £200 for cash, £200 in respect of a liability of the old business, which liability was taken over by the company, but from which his creditor would not release him, and £100 for salary due. In March, 1910, on the occasion of his marriage, witness transferred to the trustees of the marriage settlement his £1,000 first debentures and £960 shares, whilst Mr. Levy transferred £500 first debentures.

So that at the present time £1,500 first debentures are held by the trustees of your marriage settlement?—Yes.

And Mr. Levy holds £500 first debentures and £600 second debentures?—Yes.

And you hold £500 second debentures?—Yes.

The company was pressed for money throughout its existence?—I don't think so.

But did you not continually have to get advances from Mr. Levy for the purposes of the trading?—All the advances made by Mr. Levy were for the purposes of the trading.

They amounted to £1,600?—Yes.

Examination continued: In August or September, 1911, one of the company's customers informed them that he was unable to pay his account, and asked for further time in which to do so; witness thereupon approached his father-in-law, with a view to obtaining a further advance of £1,000. He was led to believe that the loan would be forthcoming, but in the early part of October Mr. Levy told him that "it was no good enough to put any more money into the concern." On September 25th witness had consulted his solicitor regarding the position of the company, and was advised that if the desired advance was not forthcoming, "the best thing to do would be to close the concern up." A notice of voluntary liquidation was sent out to the shareholders on September 28th; a meeting of the shareholders was held on October 6th, when a resolution for voluntary liquidation was passed, and Mr. G. E. Corfield, chartered accountant, was appointed as Receiver on behalf of the debenture-holders, and took possession of the company's property and assets.

Did you propose Mr. Corfield for the post of Receiver?—Yes.

The Senior Official Receiver: Then he was practically your nominee.

In further examination, the witness stated that, between September 1st and October 6th, inclusive, goods to the amount of £1,613 were delivered to the company, and he admitted that he had never ordered goods to that extent within a corresponding period in former years. In addition to the goods which were delivered, orders were given to two firms for stock to the value of £160, which were not delivered, but witness only knew of one, at least, of those two orders having been given, until after the winding-up order was made against the company. It was probably the fact that, out of the £1,613 worth of goods delivered in the last six weeks of the company's existence, nearly one-half was delivered after September 25th—the date on which witness consulted his solicitor upon the company's position.

And goods to the extent of £236 were actually ordered after September 25th?—Those goods were ordered by Mr. Howlett, as a rule.

Did you order any of them yourself?—I cannot say. I must have ordered a few, but I cannot remember what they were.

Did you tell Mr. Howlett to stop the orders after you consulted with your solicitor?—No.

Did you tell him you had seen your solicitor and what his advice was?—I did.

Did he say anything about that?—I cannot remember what he said, but he was under the same impression as myself—that the money would be forthcoming.

From September 1st to October 6th, 1911, goods to the extent of £665 were sold?—Yes.

The result of those transactions was a considerable addition to the stock during that period?—Not a considerable addition.

Well, an addition of over £1,000?—Yes.

So that the security available for the debenture-holders was greatly enhanced at the expense of the unsecured creditors?—Yes.

Was the principal reason for making these considerable additions to the stock to enhance the value of the debentures?—No, sir.

You received your salary as managing director in full?—I thought I did not, but it appears that I did.

Witness further agreed that the business was still being carried on at Moor Street, and the proceeds of the sales were being received by the Receiver for the debenture-holders. He was now acting as manager for the Receiver at a salary of £4 per week. No attempt had been made to dispose of the goodwill, but in October or November, 1911, an attempt, in a private and confidential manner, was made to sell the business as a going concern.

And the proceeds of the sale of these goods are devoted to paying off the debentures?—I suppose you are right.

Mr. Rook asked the witness: Seeing that goods to the value of £1,613 were delivered between September 1st and October 6th, 1911, what was the value of goods ordered between those dates but not delivered?—Witness replied that he had not the slightest idea.

But surely everyone you gave orders to did not send them in?—I should think they did.

Mr. Rook: Well, if so they are "one of us."

Further replying to Mr. Rook, witness said the orders given would have been signed by Mr. Howlett, or Mr. Williams, the accountant, or ——

Mr. Rook: The office boy, did he sign orders?—That is a silly question.

Referring to goods supplied by a certain firm, Mr. Rook remarked, "You always told me their goods were too dear for you; they were cheap to you then, I suppose."

Asked regarding a duplicated order, witness explained that it had been duplicated by mistake. He would not admit that he was very pleased to get delivery of both sets of goods.

Mr. Rook: Where is Mr. Howlett?—He has gone to Canada.

Did he pay his own passage money?—No.

Very well, I won't ask you who did. Now, you had certain goods on consignment?—The company did.

But you are the company. You were vendor, shareholder, debenture-holder and managing director. Why have you not set out the lease as an asset in the statement of affairs?—Because the dilapidations would cost more than the lease is worth.

Mr. Rook: When you sold the business to the company it was valued at £370, and you are still occupying the premises, although the lease is of no value.

Mr. Whateley: He is not occupying the premises.

Mr. Rook: If he is not, his ghost is in the shape of the Receiver.

The Witness reminded Mr. Rook that before leaving this country for Canada, Mr. Howlett saw the members of the Committee of Inspection, and informed them that he had been offered an appointment in Canada.

Mr. Rook: Who had, or will have, the advantage from the orders given in September, either by you or Mr. Howlett, or the others?—Eventually the debenture-holders will.

It was your intention for them to have it?—Certainly not.

The Registrar: We need not go into the witness's intentions.

Re-examined by Mr. Whateley, Witness agreed that the goodwill which had been taken at £1,128, was partly represented by book debts owing to the business at the date of the company's formation. Although he had told the Senior Official Receiver that the company was pressed for money, no writ had ever been issued against them. All the departments, except the shipping department, showed a profit on the trading, and witness only discovered at the latter end of last October that that department was not making a profit. Mr. Corfield, the Receiver for the debenture-holders, had never previously been employed either by witness or the company, but he had acted for certain of the creditors. Mr. Levy had advanced money to the company from time to time, and right up to October 6th, 1911, witness felt certain that he would make them a further advance.

Mr. Whateley: Is there any ground for the suggestion that you ordered goods because you wanted to cheat the unsecured creditors for the benefit of the debenture-holders?—Certainly not. The witness added that having in the usual way ordered goods heavily in May, 1911, the orders dropped down in June, July and August, with the result that it was necessary to replenish the stock in September. When he gave the orders in the latter month he had no idea that they would have to close down. The value of the duplicated order referred to by Mr. Rook was £8.

The inquiry was closed.

NEW PATENTS APPLIED FOR, 1912.

(NOT YET PUBLISHED.)

Compiled expressly for this journal by MESSRS. W. P. THOMPSON & Co., Electrical Patent Agents, 285, High Holborn, London, W.C., and at Liverpool and Bradford, to whom all inquiries should be addressed.

15,878. "Galvanic batteries." H. E. FRY. July 8th.

15,905. "Electric lift or hoist starting-rod or rope-locking apparatus." M. T. MEDWAY. July 8th.

15,915. "Method of enabling microphones to be worked when connected in parallel." R. GOLDSCHMIDT. July 8th. (Complete.)

15,920. "Electric aerial rail or rope-ways." ELEKTROMOTOREN-WERKE HERMANN GRADENWITZ. (Addition to and divided application on 12,833, 1912. Convention date, July 8th, 1911, Germany.) July 8th. (Complete.)

15,927. "Electric arc lamps." M. A. HERWIG. July 8th. (Complete.)

15,930. "Tensioning device for the contact wires of electric trains." BERGMANN-ELEKTRICITATS-WERKE, AKT.-GES. (Convention date, August 23rd, 1911, Germany.) July 8th. (Complete.)

15,937. "Metal-vapour rectifiers and similar apparatus." E. HARTMANN. (Convention date, March 12th, 1912, Germany.) July 8th. (Complete.)

15,952. "Telephone-machine switching-system." WESTERN ELECTRIC CO., LTD. (Western Electric Co., United States.) July 8th.

15,957. "Electric heaters." FERRANTI, LTD., and J. ROOTHAAN. July 8th.

15,958. "Electrically-heated devices." E. C. R. MARKS. (Landers, Frary and CLARK, United States.) July 8th. (Complete.)

15,959. "Systems of electric lighting." E. C. R. MARKS. (Jehangir Sorabjee Banajee, India.) July 8th.

15,960. "High-efficiency electric incandescent lamp and holder. E. C. R. MARKS. (J. S. Banajee, India.) July 8th.

15,961. "Electric toasters and the like devices." E. C. R. MARKS. (Landers, Frary & Clark, United States.) July 8th. (Complete.)

16,002. "Electric switches, bell pushes, gas controllers, and analogous articles." M. AHRONSBERG. July 9th.

16,024. "Means for electrically lighting road vehicles or other rolling stock." L. KREBS. July 9th.

16,040. "Induction electric furnaces." J. BALLY. (Convention date, July 11th, 1911, France.) July 9th. (Complete.)

16,041. "Electric retort furnaces." J. BALLY. (Convention date, July 11th, 1911, France.) July 9th. (Complete).

16,042. "Electric boilers," J. BALLY. (Convention date, July 11th, 1911, France.) July 9th. (Complete.)

16,043. "Electric transformer boilers." J. BALLY. (Convention date, July 20th, 1911, France.) July 9th. (Complete.)

16,044. "Process for manufacturing fire-proof electrically conducting moulded bodies." GEBRUDER SIEMENS & Co. (Convention date, July 20th, 1911, Germany.) July 9th. (Complete.)

16,048. "Apparatus for automatic electric heating." H. LEITNER. July 9th.

16,065. "Switches for electric wiring systems." L. MILNE. July 9th.

16,082. "Signalling apparatus, particularly for use in mines." STERLING TELEPHONE AND ELECTRIC CO., LTD., and F. G. BELL. July 9th.

16,084. "Secret intercommunication telephone systems." TELEPHONFABRIK AKT.-GES. VORM J. BERLINER. (Convention date, December 22nd, 1911, Germany.) July 9th. (Complete.)

16,096. "Electrically-controlled rove stops." J. R. K. SHARP. July 9th. (Complete.)

16,104. "Means for connecting electrical conduits to their fittings." ELECTRICAL CONDUITS, LTD., and J. R. A. HEMMING. July 10th.

16,119. "Brackets or pendants for gas, electric and other lighting purposes." H. PERRY. July 10th.

16,126. "Electric battery lamps." H. HUNTE. July 10th.

16,134. "Prepayment meter for electricity, gas, or the like." ALLGEMEINE ELEKTRICITATS-GES. (Convention date, July 10th, 1911, Germany.) July 10th. (Complete.)

16,142. "Time switch." S. CHIGER. July 10th. (Complete.)

16,144. "Electrical contact plugs for switchboards or the like and method of producing same." M. B. RICHTER. (Convention date, July 10th, 1911, Sweden.) (Complete.)

16,147. "Protection of electric mains and the like." W. B. WOODHOUSE. July 10th.

16,150. "Electric heating or cooking apparatus." SIEMENS BROS. DYNAMO WORKS, LTD., and H. A. BATE. July 10th.

16,151. "Selector switching device for automatic telephone systems and the like." TELEPHON APPARAT FARRIK E. ZWIETUSCH & Co., G.m.b.H. (Convention date, January 18th, 1912, Austria.) July 10th. (Complete.)

16,152. "Method of moisture-proofing cord conductors." WESTERN ELECTRIC CO., LTD. (Western Electric Co., United States.) July 10th. (Complete.)

16,153. "Electric cable sheath." WESTERN ELECTRIC CO., LTD. (Western Electric Co., United States.) July 10th. (Complete.)

16,163. "Wave detectors for radio-telegraphy and telephony." L. J. L. D. THIBAULT. (Convention date, May 24th, 1912, France.) July 10th. (Complete.)

16,164. "Electric discharge apparatus." R. MORETTI. (Convention date, July 15th, 1911, Italy.) July 10th. (Complete.)

16,174. "Automatic electric supply system." H. LEITNER. July 10th.

16,207. "Accumulator case and the like." J. A. WALSHAW. July 11th.

16,219. "Treating iron scrap by electrolysis." H. C. WOLTERECK and J. MOELLER. July 11th.

16,229. "Electrical switches." A. H. KLING and B. D. HORTON. (Convention date, July 11th, 1911, United States.) July 11th. (Complete.)

16,231. "Electromagnetic hammer." W. RICHARDS and W. W. RICHARDS. July 11th.

16,241. "Telephones." E. RAMDOHR. July 11th. (Complete.)

16,269. "Automatic cut-outs and ammeters for car-lighting and other dynamos." OPTALYTE, LTD., and J. HEWETT. July 11th.

16,270. "Electrical connections for motor-car lamps and the like." OPTALYTE, LTD., and J. HEWETT. July 11th.

16,287. "Electric-current governors." J. F. W. SEARLE and S. H. LACEY. July 12th.

16,296. "Method of carrying out chemical gas reactions by means of an electrical discharge." H. ANDRIESSENS and J. SCHEIDEMANDEL. July 12th. (Complete.)

16,307. "Appliances or means for mounting incandescence electric lamps and the manufacture thereof." A. W. BEUTTELL. July 12th.

16,317. "Thermostats for controlling electric circuits." A. W. PRIM and F. W. ROPER. July 12th.

16,318. "Electric conduits." E. A. EDWARDS. July 12th.

16,343. "Electric controllers, starting switches and the like." SIEMENS BROS. DYNAMO WORKS, LTD., and B. G. PAYNE. July 12th.

16,358. "Maximum time meter." ALLGEMEINE ELEKTRICITATS GES. (Convention date, July 14th, 1911, Germany.) July 12th. (Complete.)

16,360. "Telephones and hooters for motor-cars." STERLING TELEPHONE AND ELECTRIC CO., LTD., and F. G. BELL. July 12th.

16,374. "Subscribers' stations in automatic telephone systems." ZIVNOSTENSKA BANKA V PRAZE. (Convention date, July 12th, 1911, Austria.) July 12th. (Complete.)

16,384. "Apparatus for measuring the electric conductivity of liquids." M. COPLANS. July 13th.

16,406. "Revolving electric furnace intended chiefly for the manufacture of aluminium nitride." SOCIETE GENERALE DES NITRURES. (Addition to 29,299/10. Convention date, August 4th, 1911, France.) July 13th. (Complete.)

PUBLISHED SPECIFICATIONS.

Copies of any of the Specifications in the following list may be obtained of MESSRS. W. P. THOMPSON & Co., 285, High Holborn, W.C., and at Liverpool and Bradford; price, post free, 9d. (in stamps).

1911.

ELECTRICAL POTENTIAL REGULATORS. M. Fuss. 7,220. March 22nd. (March 22nd, 1910.)

ELECTRO-DEPOSITION AND REFINING OF ZINC. V. C. Tainton and J. N. Pring. 7,236. March 23rd.

SYNCHRONISING OR LIKE DEVICES OR APPARATUS. J. Chansay and L. F. Rampal. 12,752. May 26th.

THERMO-ELECTRIC GENERATORS. C. V. Albrecht. 14,234. June 15th. (December 15th, 1911.)

COMBINED BOILER AND THERMO-ELECTRIC GENERATOR. W. P. Perry. 15,087. June 28th.

SELECTIVE-CALLING APPARATUS. E. B. Craft and G. Brown. 15,920. June 30th. (June 30th, 1910.)

MANUFACTURE OF ARTICLES OF TUNGSTEN. British Thomson-Houston Co. (General Electric Co.) 15,586. July 4th.

MANUFACTURE OF ELECTRICAL CONDENSERS AND SIMILAR APPARATUS. J. A. L. Dearlove and S. G. Brown. 16,554. July 18th.

ELECTRIC ARC LAMPS. Engineering and Arc Lamps, Ltd., and A. T. Dowdell. 16,679. July 20th. (Cognate application, 969 of 1912.)